Università
Ca'Foscari
Venezia

Master's Degree programme

Second Cycle (D.M. 270/2004)

in

Global Development and Entrepreneurship

Final Thesis

Industrial Clusters in the Knowledge Economy. Innovation paths in an Italian Furniture District

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Academic Year
2018 / 2019

To my Mother and Father,

for always being there

The greatest enemy of knowledge

is not ignorance,

it is the illusion of knowledge

(Stephen Hawking)

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Abstract

Nowadays, the district and clustered industrial realities are increasingly assuming importance within an international and globalized context.

Through an initial literary and historical analysis, tracing the evolutionary paths and the main differences, we focused on the study of the resources and competitive factors guaranteeing the survival of these industrial entities within the global markets.

Therefore, we studied the element "knowledge" as the key to constant innovative progress. We examined the peculiarities of this resource, from creation to transfer, from assimilation to the production of new knowledge, paying attention to the fundamental order of networks of relationships that are created between the various actors involved.

Later, in parallel with the study of knowledge communities and learning societies, we analyzed districts and clusters as local innovation systems and knowledge integrators, focusing on innovative and cognitive aspects. In this way we have been able to represent these districts as the real engine for international development and survival.

Finally, these studies have been projected on an industrial reality present in our national territory, the Cluster Arredo/Casa FVG. Through an empirical patent study and an analysis of knowledge integrators within this reality, we can therefore conclude by stating that forms of aggregation such as districts and clusters, registering a greater propensity to exploit the knowledge resource and a greater inclination to innovation and to the cognitive circulation, they still represent a survival model for the current strongly globalized context.

Introduction

Nowadays, the economic scenario has been profoundly changed by numerous factors derived from the processes of globalization and internationalization, such as the introduction of new competitive players, new technologies and new needs in the global economy.

Among the national and local realities most interested and exposed to these mechanisms and globalization changes emerge the industrial districts. These agglomerations appear as a concentration of mainly small and medium-sized companies within a limited geographical area, which collaborate and cooperate aiming the development of innovation, knowledge, technology and a reduction in transaction costs. Numerous scholars fear that these districts, which have maintained the national economic fabric for more than a century, are no longer able to cope with sudden global progress and therefore unable to guarantee a certain level of competitiveness.

In the last decade, this weakening of manufacturing districts has however been accompanied by the strengthening of new realities that have been able to implement processes of innovation and internationalization. These new highly specialized localized agglomerations with high innovative and technological content, called clusters, are based on investments in R&D and on the management of a network of information, innovation and knowledge relationships. This inclination gave birth to a unique and competitive model capable of supporting local, regional, macro-regional and national development.

The purpose of the thesis is to give a more complete and efficient representation of the district context, analyzing it and projecting it into the current competitive scenario. In this way the competitive drivers, factors and elements underlying the global success, based on international competitiveness, on innovation and on the modern resource of knowledge. These factors will then be taken up and analyzed in a district and clustered key, defining their concrete and crucial importance for survival within international markets. To this end, the thesis was preferably divided into four chapters.

In the first chapter we will give a first definition of district, analyzing the relative literature and the evolutionary path from the origin to the present day. Through the study of literary contributions produced in the last century, among which we highlight the works of Alfred Marshall, Michael Porter, Paul Krugman, Giacomo Becattini, Fiorenza Belussi, Giuseppe

Tattara, Marco Bellandi and Fabio Sforzi, we will proceed with the representation of the characteristic and innovative elements of these economies, such as specialization, access to international networks and the dissemination of knowledge.

After examining the competitive advantages, we will open a parenthesis on the constitution and development of the districts in the Italian territory. The following paragraphs will analyze the ever-changing model that has been the backbone of the Italian economy and of Made in Italy, examining the current situation and the evolutionary and strategic trajectories of recent decades, to cope with global changes, expansion of domestic demand and international competitiveness.

The attention in the last paragraphs of the first chapter will be oriented towards the concept of cluster, understood as an evolution of the district model in response to changes in international markets. The theoretical integrations of Michael Porter, Giacomo Becattini, Bengt-Ake Lundvall, Enzo Rullani, Robert Huggins, Philip Cooke, Henry Etzkowitz, Loet Leydesdorff and Ariel Dorfman will help us to understand the evolutionary drivers of these new knowledge intensive entities, mostly focused on innovation, on internal R&D activities, on technological development and on maintaining a rich network of knowledge flows. We will thus focus on cognitive elements of learning, on the role of government and institutions, on synergetic collaborations, on projects and on processes in this new knowledge-based economy.

Subsequently, the chapter will conclude with a brief summary of the main similarities and discrepancies between the two aggregation models described.

The second chapter will explore the concept of knowledge as an innovative and competitive resource. The first paragraphs will analyze Cesar A. Hidalgo's approach focusing on the order of increasingly complex networks and on the related exchange of information, highlighting the importance of an efficient collection of knowledge and know-how. In this modern context, economies and networks are understood as a collective ecosystem capable of producing know-how, becoming a true chain of knowledge. Subsequently, this cumulative resource will be presented by relying on the literary contributions of Karl Polanyi, Sharon Matusik and Charles Hill, analyzing the main elements, characteristics, different degrees of accessibility and creation processes. Later we will pay attention to the learning processes introduced by Daniel Levinthal, James Gardner March and Gabriel Szulanski, to the mechanisms of knowledge creation

through the Ikujiro Nonaka and Hirotaka Takeuchi model and to the transfer and reproduction procedures within the districts of Udo Zander and Bruce Kogut.

In a second stage, knowledge will be projected within the concept of clusters through a knowledge-based view, representing in this context the crucial developer of all entrepreneurial activity, with the aim of creating and updating the resources that generate the competitive advantage.

At this point, the chapter will address the processes of knowledge transfer in the district areas. First of all, the mechanisms of knowledge transfer between district companies that involve a decrease in information costs and the creation of stock knowledge will be analyzed. Subsequently, after having introduced the role of the focal firms within the district activities, we will examine the processes of knowledge transfer outside the borders, to then conclude with the internal transfer to a district organization. After analyzing the absorptive capacity of the districts, as the subjective ability to identify, share and exploit the knowledge of the counterparts according to Wesley M. Cohen, Daniel A. Levinthal, K.M. Langa, D.J. Llewellyn, I.A. Lang, D.R. Weir, R.B. Wallace, M.U. Kabeto and F.A. Huppert, these concepts of transfer, socialization, outsourcing, internalization, combination, absorption and production of knowledge will be examined within the clusters.

The third chapter begins with a more humanistic perspective on the cognitive limits of the individual subjects and the collaborative capacity to relate. Through the studies of Steven Sloman and Philip Fernbach, we will try to understand economic development despite the low level of individual knowledge, based on sharing this cumulative and abstract resource. In this way, the knowledge community becomes a kind of learning society.

From this point, the theme of learning will play an increasingly important role in the processes of development and innovation, giving rise to spillovers within an open economy. In these paragraphs we will analyze the functions of those companies that hold the responsibility to provide for the exploitation and dissemination of knowledge, aiming the implementation of a learning society. Then, we will analyze the economic, macroeconomic, financial, industrial, commercial, social, environmental, institutional and training policies, whose purposes are the productive, competitive and cognitive accumulation improvements.

Subsequently we will explain how the implementation of a learning society, introduced by Bruce C. Greenwald and Joseph E. Stiglitz, leads to consider the districts and clusters as local systems of innovation, promoting an economic, innovative, productive, relational, cognitive and competitive growth. We will highlight the importance of relational channels and the mechanisms behind the support of knowledge absorption phases, in particular from and to the outside. In addition, we will study district-global firms, which are the basis of the development processes and international openness of these innovative localized systems.

Finally, considering the need to implement an open economy, to enhance and innovate the Made in Italy and the production chain, to internationalize and relate to the external ecosystem, we will apply the studies of professors Giulio Buciuni and Gary Pisano related to the theme and functions of knowledge integrators and network knowledge integrators. We will deepen the strategic processes, the decisive competitive factors, the prerequisites, the policies, the procedural phases and the management of these organizational apparatuses which support the processes of knowledge creation and circulation in local areas, ensuring their innovative development at global level. In conclusion, we will discuss the possible strategic theories that the districts, clusters and in particular the newly formed figure of the cluster manager can implement to face future challenges as gatekeepers of knowledge and as productive and innovation centers.

In the last chapter we will transpose the topics of the previous chapter into a typical manufacturing area of our nation, which has marked the Italian wood-furniture sector and the Made in Italy value for almost a century. In this way, assuming the area occupied by the Cluster Arredo/Casa Friuli Venezia Giulia as a territory of analysis, we would retrace the themes concerning knowledge and its importance in survival and innovative development, related to the current globalized context and above all to the role that knowledge integrators are hiring during the dissemination of this resource and international upgrading.

First of all, we will trace the main evolutionary and successful traits of the two district realities in the sector that characterize and support the territory of Friuli Venezia Giulia, that are the Manzano Chair District and the Livenza Furniture District, up to the most recent weakening affected in particular by an increasingly globalized scenario. This slowdown and this need for development that marked the end of the two districts gave life to the Cluster Arredo/Casa representing the two territorial district entities.

After offering a detailed image of the Cluster A/C we carry out an in-depth analysis with the aim of measuring the presence of innovation activities and knowledge diffusion in the clustered area. The purpose of this empirical research will be to confirm a greater propensity for innovation and cognitive exchange within these realities compared to the rest of the national market. This measurement will be carried out by analyzing the patents produced within the local area and the related patent citations that will allow us to understand the innovative trend and the size of the networks created.

Subsequently, assuming a more innovative perspective, we will try to understand this cluster not as a mere form of aggregation but rather as a knowledge integrator and network knowledge integrator, first exposing the relative Italian situation and then taking up the two districts again. In this phase, we will relate according the studies of professors Buciuni and Pisano, focusing on the understanding of competitive factors of production and knowledge transfer.

This research takes into consideration the highly industrialized Italian territory of the North-East, assuming as samples two pairs of districts belonging to two different sectors. These pairs, formed by the Footwear District of Riviera del Brenta as opposed to the Montebelluna Sport Shoe District and the Livenza Furniture District compared to the Manzano Chair District, include one constantly evolving district and one in decline due to the global context and therefore they are more suitable to define the factors of success and failure of the local territory.

The analysis of the two districts of Friuli as integrators will lead us to a more detailed study of the Cluster A/C FVG (intended as consortium entity) as a network knowledge integrator for the survival of the represented local area. In this way we will try to describe the initiatives, the eventual projects, the possible activities, strategies and innovations brought by this new figure aimed at maximizing the production, supply and value chain.

Finally, the chapter will end by looking at the future of the cluster, the new processes of internationalization and direct control of global markets, thus focusing on recent strategic penetration projects introduced with the aim of enhancing productivity and the Made in Italy value, guaranteeing a constant innovative development.

Chapter I
Districts and Clusters

Even today, in particular due to the current economic dynamics, the study of districts and clusters attracts the interest of various disciplines.

In this chapter we offer a detailed analysis of these two organizational models that represent a typicality of the Italian economic system, as well as the basis of the development of the system itself and of the sustenance of the Italian economy.

In the first part of the chapter the district is analyzed focusing on the reference literature, describing later how this peculiar organizational form originated and evolved, especially in our country, highlighting strengths and weaknesses that district businesses will have to exploit in the future in order to maintain a competitive advantage. We will deepen the literary notions that provided the first bases for the explanation of these aggregate realities, starting from the first definitions of Marshall until the resumption by Italian literature, with the interest of authors such as Sforzi, Becattini and Rullani. Here, we will analyze the structure and organization of these industrial groups, observing the management and drivers of innovative progress, to even face possible future and global challenges.

In these district territories there is an union between competition and collaboration, where information, knowledge and skills circulate along the networks created between the various actors that participate in this industrial atmosphere (Marshall, 1919; Sforzi, 2008). The district area is thus understood as a socio-cultural entity with high industrial specialization (focused on the enhancement of Made in Italy), capable of attracting qualified professionals, suppliers and specialized partner figures, which favour the production of knowledge spillovers (Becattini and Rullani, 1993; Becattini, 2004).

The final paragraphs of the chapter will revisit the literature on clusters, with a subsequent study of its development. This aggregation arrangement is presented as a geographical system, a set of companies and institutions integrated with each other within a defined territory, with a greater inclination towards knowledge, innovation and new technologies. In this way, analyzing the theories of docents such as Porter, Cooke, Huggins and Rullani, we are able to efficiently identify the main similarities and discrepancies between the clustered model and the district model, with crucial attention to the management, coordination, and the role of institutions, firms and policies (Porter, 1998; Etzkovitz and

Leydesdorff, 2000; Cooke and Huggins, 2001). We note that in this new form of aggregation, concepts such as global competition and internationalization find greater attention and application with respect to district realities.

1.1 The concept of district

1.1.1 Literature and evolutionary path of districts

Although in recent years the district context is gathering even more attention, the definition of "industrial district" was introduced in the nineteenth century going to delimit "a set of industrial or professional activities belonging to a single species, which are grouped in a specific geographical area, both in cities and in other regions" (Sforzi, 2008). The first intellectual bases of the industrial district can be linked to Alfred Marshall, who, dwelling on the organization of these concentrations of specialized industries in particular regions, states that "the grouping of many small artisans and entrepreneurs or a small number of large productive complexes, within a territorial context, allows to achieve those benefits deriving from large-scale production" (Marshall, 1890). So, defining it, we are going to delimit a density of companies mainly composed of small and medium-sized units, delimited within a territorial area, specialized in different production phases that relate under an economic and social network. Thus, a socially distinct group is outlined, a unique and unitary economic-social element, culturally homogeneous, where competition and cooperation coexist (Marshall, 1919).

The fact that companies inside are specialized in different production processes allows to outsource the supply chain. This fragmentation allows a labour specialization with a consequent efficient transfer of knowledge, diversifying the risks among the companies of the network and making themselves flexible to future market changes. The vertical and horizontal specialization of the production allows to find the qualifying object of the productive sector as there is an homogeneous manufacture.

In this Marshall's context, companies cooperate within this socio-economic entity, integrate collaboration activities by sharing the local value chain, and at the same time they compete by operating in a single productive sector (Marshall, 1919). In the district the competitive process joins the collaborative process. In this way, the district boundaries weaken and change, varying the coexistence and the internal composition of the district. Thus, a context is born where ideas, knowledge and industrial competencies are no longer

incorporated within the single company, but rather they are free, accessible and learnable by all the actors present within this industrial atmosphere.

The territory is nothing more than a real economic infrastructure, as well as cognitive and social, capable of providing foreign economies, encouraging production processes, the circulation of knowledge and incentives for innovation (Belussi, 2007).

Although companies belong to the same market sector, it is important to state that within the district it is possible to find production inhomogeneity, given the presence of subsidiary activities outsourced through relations with sub-supplier companies and collaboration between commercial intermediaries that allow a division of labour with a certain level of specialization and information flows (Marshall, 1890). The formers hold the ability to contribute to production by maximizing the activity of specialized machinery, seriously reducing transaction costs; the commercial intermediaries instead, creating a connection with the final market, allow to effectively understand the needs of the customers (Marshall, 1919).

The activity and dynamism of the districts derive from "a production system generated by a network of productive relationships, in which some companies hold a specialization in certain production phases, others in related sectors to support development and innovation" (Ricciardi, 2010). The focus is therefore on a continuous redistribution of business functions (mainly productive) between the different parts of the district, and in parallel on a close inter-partes connection.

According to Marshall's method, the competitive advantage of the district, and therefore of the companies therein, depends on the presence of internal economies subordinated to the resources and to the strategic and business organization, and on the concentrations of similar small businesses in given areas recognized as external economies.

These new concepts of economy hold the organization and the importance of knowledge among the productive factors, generating positive sectoral externalities and going to determine increasing returns of scale at the local level (Brusco, 1989). They are associated with the placement of the district company in the territory, favouring decentralized production, where production standardization is minimal and where diversification and variety is enhanced.

The advantages of SMEs within this geographical area, deriving from large-scale production, can be achieved through the support of these economies (external to the single company and internal to the district), which allow the transfer of information and

cognitive processes; as well as developing a pool of skilled labour force. These economies, according to Marshall's vision, are divided into three groups (Marshall, 1890):

- Specialization economies: which allow the use of productive capacities within the specialized activities;
- Learning economics: focused on the widespread learning mechanisms that will then be analyzed in the following paragraphs;
- Economies of creativity: promoting product/productive variety and newness through relationships within the local area.

Another distinction can be detailed based on the static or dynamic nature of the economies themselves. In the case there is relations with static external economies, there will be links of economies of scale dependent on the value of the assets; the dynamic external economies instead depend on the stage of the evolutionary cycle of the district.
Connecting to the work of Bellandi, given evidence and existence of these elements, even the relationships that are created within a district can be of different nature (Bellandi, 1982):

- Vertical or convergent: in which the companies that take part are specialized in different adjacent phases of the productive cycle;
- Horizontal: involving companies with similar productive activities;
- Diagonals: between product and service companies that need support in productive processes.

The first Italian contributions to the district's socio-economic concept introduced by Marshall are concerned about the explanations of the strong development of certain local Italian areas offered by the economist Becattini (Becattini, 2004). According to Becattini the industrial district is presented as a “delimited territory, composed of a prevailing group of specialized SMEs within a single productive process, which generate a network of institutions promoting cooperative and competitive relations between companies and professional figures, as there is a rather entrenched territorial culture” (Becattini, 1979).
The decision to locally concentrate can give rise to the “agglomeration economies”, in which the disintegration of the production and value chain offers an effective and efficient organizational and managerial alternative (Tattara, 2001).

Trying to schematize the characteristic elements introduced by the cited authors, we can identify in this socio-cultural entity:

- The presence of a local community determined by the set of values of the community itself and by the institutions;
- The presence of external economies, or agglomeration economies;
- The presence of a common socio-cultural base that involves the sharing of objectives and the dissemination of knowledge and technology.
- A concentration of companies active in a given territorial area and in certain sectors, which allows a localized labour division (Becattini, Pyke and Sengenberger, 1991);
- A socio-cultural homogeneity of the local community which, through human resources, competencies and specific professional qualities, allows the formation of an "industrial atmosphere";
- A reference market, ultimately increasingly global, characterized by simultaneous competition and cooperation;
- A territorial environment characterized by incremental innovative processes, in which business association and the support of local institutions are privileged.

The industrial district therefore creates an "economic and social environment where the relationships between the subjects are manifested both inside and outside the productive areas" (Sforzi, 2008).

1.1.2 The competitive advantage

Literature has understood the district as an industrial model, based on the bottom up criterion, in which a complex and different business project is generated, where the source of progress is given by the local territorial proximity and by the resulting relationships.

As already stated, the district model bases its competitiveness on the productive capacity to concretely and readily respond to a constantly changing market. This system of specialization and division allows the preservation of a progressive cognitive circulation, facilitating the increase in productivity, the reduction of certain costs and in particular the accumulation of specialized knowledge.

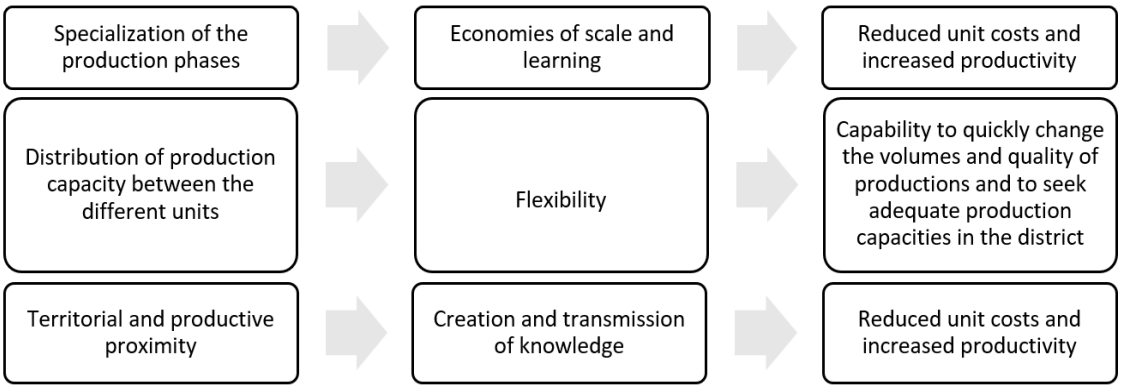
In this relationship between businesses and the territory there is also the participation of the local community, increasing learning and skills generating tacit knowledge (Becattini

and Rullani, 1993), considered an essential resource for the competitive advantage of districts. Ultimately, the social context determines another competitive advantage of the district, favouring the transfer of information to and from a wider economic area.

The industrial specialization determines the mechanism concerned with the trade-off between diversification and integration, which consists in the complementarity between the spin-offs of the production process phases in a dynamic environment characterized by the coexistence of cooperation and competition (Belussi, 2007). The district cooperation reduces transaction costs, supporting the production chain and the production of knowledge necessary to achieve a competitive advantage.

For the district, the capacity to innovate is mainly determined by tacit knowledge and its difficult diffusion. With this term, we refer to that contextual knowledge, connected to the community and the local territory from which it was generated (Fig. 1.1).

Fig. 1.1: Competitive advantages in district areas



Source: Ricciardi A. (2013), *"I distretti industriali italiani: recenti tendenze evolutive", Sinergie, rivista di studi e ricerche*, vol. 31, n. 91, Fondazione Cueim, pp. 21-58.

The study of the evolution of different industrial districts has led to classify the advantages over the competition in two macro groups (Gonzalez-Val and Pueyo, 2009):

- First-nature advantages: related to objective elements such as environmental resources, geographical location or territorial form;
- Second-nature advantages: influenced by transport costs, economies of scale and costs related to the placement.

Among the main elements responsible for efficiency and convenience to agglomerate, we find the propensity to generate a pool of qualified professional figures, the ability to attract specialized suppliers and partner figures, and the aptitude to favour knowledge spill over

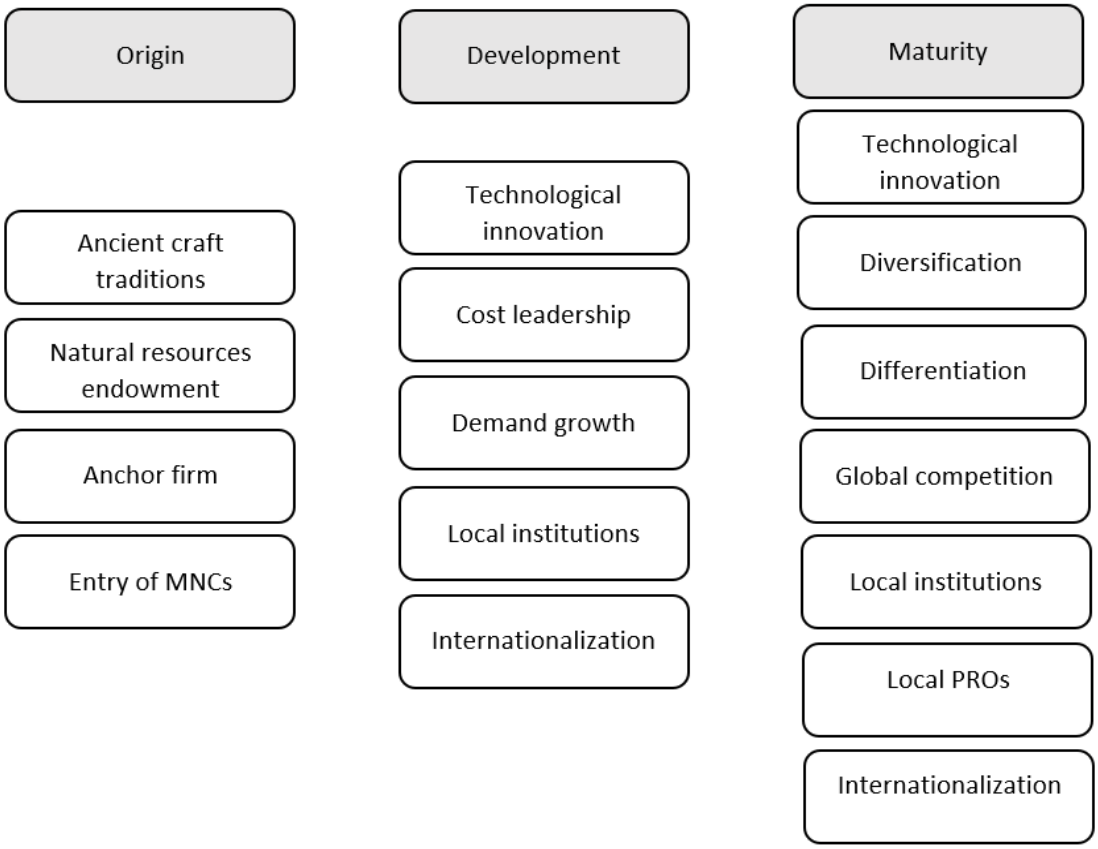
(Sforzi, 2005). We can agree that this virtuous development process is triggered by the propagation and transfer of know-how, defined as the crucial supporter of diffusion of innovation.

A vision is introduced, therefore, oriented towards the creation of a network of companies based on the integration of productive processes with the facilitation of the circulation of information and knowledge between the various actors. Moreover, the agglomeration brings further advantages in the field of productivity, regarding the efficiency, the competitive dynamics and the accumulation of resources, innovation, information and spill overs. Thus, we achieve a strengthening of the advantages of geographical proximity, as the companies themselves develop a tendency to increase the entrepreneurial density within the territory, thickening the importance of the local market with regard to the creation of knowledge, its transfer and the productive factors (Tattara and Volpe, 2001).

The competitive benefits therefore do not derive from a dimensional growth of the companies; on the contrary, they implement a specialization in certain phases, focusing the activity on capabilities that allow the maintenance of competitive advantages of knowledge. Thus, a productive decentralization takes place which reduces transaction costs and promotes vertical productive fragmentation.

The paper presented during the conference “Entrepreneurship and Innovation - Organizations, Institutions, Systems and Regions” held in Copenhagen in 2008 is of considerable importance, concerning the development of regional and local economic systems. This paper aims to understand some typical factors of the districts evolution in order to define today's dynamic capacity of this industrial system. The purpose is to analyze which are the predominant factors during the origin, the development and the maturity phases of the district (Fig. 1.2).

Fig. 1.2: Triggering factors on district life cycle phases



Source: Belussi F., Sammarra A., Sedita S.R. (2008), "Industrial districts evolutionary trajectories: Localized learning diversity and external growth", *Paper of the 25th Celebration Conference on Entrepreneurship and Innovation* – Organization, Institutions, Systems and Regions.

In the early days of the district, competencies are originated from previous local forces and are supported by external factors. During the course of their lives, on the other hand, there is a decentralization of the governance of the productive system in increasingly numerous small businesses.

Focusing on the Italian context, we can presume the competition of the districts is based on an incremental productive and processual innovation (Bellandi, 1996), resulted from continuous interactions also with other districts, generating new technological knowledge.

Among the competitive advantages we find product differentiation and cost competitiveness, due to the progressive innovation characterized by the ability of design, planning, creativity, product know-how (characteristics of Made in Italy success), as well as the ability to react to market changes.

To protect the Made in Italy, strategies have been implemented to form systems with extreme production flexibility, coordination between companies, a convenient position of

companies within the area, an entrepreneurial capacity to influence demand and to respond quickly to changes, in order to allow system self-organization (Sforzi, 2005).
In summary, the competitive success of the district stems from the ability to relate the participation of companies and the various actors obtaining a production of innovation. We underline the importance of the grouping in order to enhance and develop individual capabilities and competences through the transmission and absorption of knowledge (Tattara, 2001). In fact, the formalization and the opening of agreements between district actors is an advantage that allows to obtain innovative and development processes.
Since 1990, globalization has created a changing and highly competitive context, testing again the district competitive advantages, activating effective internationalization mechanisms giving more verve to industrial clusters.

1.2 The establishment and development of Italian industrial districts

1.2.1 An ever-changing model

In Italy, the Marshall "industrial district" was the backbone of the national economy from the post-war period until the 1990s. It has been the propellant of the spread of the so-called Made in Italy (fuel of the Italian manufacturing economic fabric), and it has given rise to clusters with a strong territorial impact on the socio-economic sphere.
The Made in Italy district sites, due to the context in which they operate, have constantly been subject to evolutionary transformations, having to generate new products or new processes, as well as new strategies or new organizational models. These transformations have altered over time the traditional productive experiences, the characteristics and the consideration of the local, national and global target markets, the role of micro-enterprises, the dimensional sphere of production, the existing relationships and the variety of models (Becattini, 1998).
Over the past 50 years, the Italian districts have been characterized by various strengths compared to the rest of the national economic panorama (Becattini, 2004). These strengths have created a model based on access to a pool of specialized resources and competences, flexible and able to obtain lower costs and to differentiate. In fact, this environment boasts dynamic characteristics such as the gradual division of labour between local companies (a dense network of interdependencies that determine the possibility of using technological advances more easily, thus giving rise to the so-called bottom-up development), the high presence of technical/scientific knowledge and the

activation of the spiral of knowledge (allowing the productive process to renew itself and to keep up with the standards required by the market), the high rate of training of companies (favouring the improvement of production methods and refining specializations), the presence of relationships between internal and external companies, social mobility, the implementation of district institutions, the diversification of production and the growing complexity of the local economic system. These factors, together with the strong specialized artisan culture, the presence of local natural aspects, the development of important brands (Belussi, 2009), and the continuous generation of important spin-offs have confirmed the birth of the districts in the Italian territory (Sforzi, 2008).

In this way, the industrial districts have implemented a favourable and continuous balance between competition and collaboration, a growth of production and the transfer of knowledge, creating a convenient environment for many companies.

The models of the late 1970s, which saw Italy as a set of territories expressing a distinctive capitalism and society, confront a reality of territories that maintain common characteristics of homogeneity and substantial wealth and prosperity, which continues to be built on manufacturing and on an industrial structure based on SMEs which expresses collective efficiency at the territorial level.

During the 70s and 80s, these organizations focused on globally expanding their position, regarding the production of goods categorized by technological factors. In these years, district expansion has been triggered by the formation of new businesses throughout Italy (Sforzi, 2005).

From the 1970s onwards, a strong expansion of domestic demand and the creation of a common European market further developed the nature of these concentrations. The increase in per capita GDP, the growing need for products, the presence of a differentiated and constantly changing demand have led to the strengthening of these local areas.

Since 1980, however, the Italian industrial sectors (in particular the Made in Italy) had witnessed a period of particular development, while the most historic districts implemented a policy of adaptation due to the change in the international scene.

In the 1990s, the Italian industrial context was characterized by a weak development of large companies compared to other world economic forces, but also by a strong growth of SMEs at the local level, which allowed the creation of interdependent competitive systems and favoured the growth of the actual industrial agglomerations.

In this period, the strategies of internationalization and delocalization have weakened some characteristics of the district realities, slowing down their progress and expansion (Becattini, 1998).

The evolution of Made in Italy has seen a particular inflection towards the indirect component (complementary or instrumental goods) compared to direct Made in Italy (mere consumer goods), thus shifting activities towards an improvement in product quality. During this decade the districts have turned into the stimulus of productivity, innovation and training for local businesses.

In this period, the context has undergone a progressive change due to international exchanges, passing from a trade in goods to the exchange of the tasks required by the productive process of these goods (Sforzi, 2005). The result is an international labour division, aimed at the creation of global productive chains, in which the phases are seen as a continuum of tasks between nations, focusing organizational and strategic attention on this last factor (Sforzi and Lorenzini, 2002).

The evolutionary path of the Italian districts has also made changes to the evolution of other determining factors, such as the sharecropping phenomenon (prevalently widespread during the "Third Italy", which has not allowed a fair distribution of districts in the Italian territory), the role and the growing importance of cities and a school system, and the decreasing centrality of large companies enhancing in a certain sense the autonomy, centrality and prevalence of SMEs within the district.

In the last twenty years, starting from the new millennium, the Italian economy has registered a manufacturing employment growth thanks in particular to the services offered to companies. This increase in employment has registered higher levels within the districts, where integration and specialization have made the development of productive knowledge and a labour division possible.

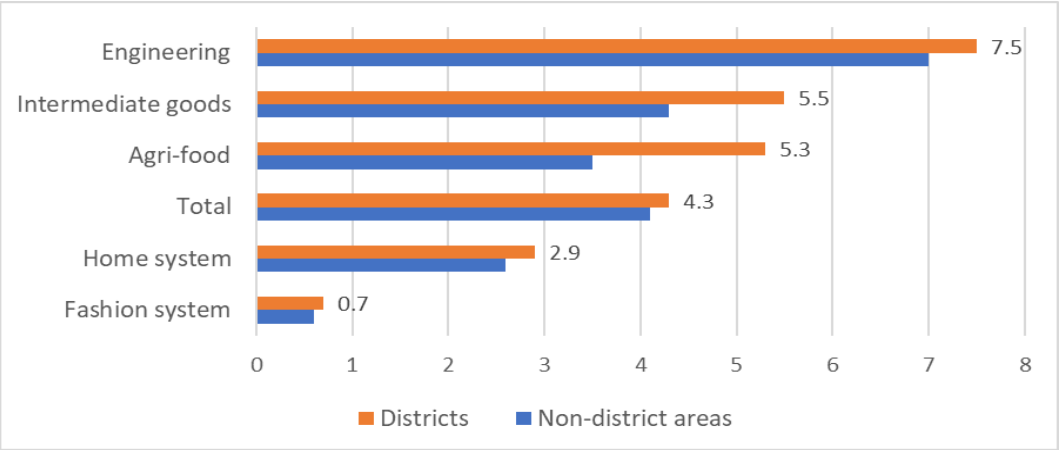
At the dawn of the new millennium, the Italian district system was profoundly influenced by a crisis generated by negative economic conditions, as they were forced to pursue international companies. In fact, some districts have responded with an abrupt change of form, delocalizing part of the production and breaking that cooperation relationship between several companies in the same district, or adopting policies that have transformed their composition and size (Belussi, Sammarra and Sedita, 2008). However, most of the productive activities were still anchored to the local and district territory, intensely specialized and mainly composed of small and medium enterprises.

1.2.2 Current Italian district economic condition

In this chapter we will quickly analyze the eleventh edition of the "Economic and Finance Report of the Industrial Districts", in order to present the district reality in Italy and understand their inclusion in the current economy.

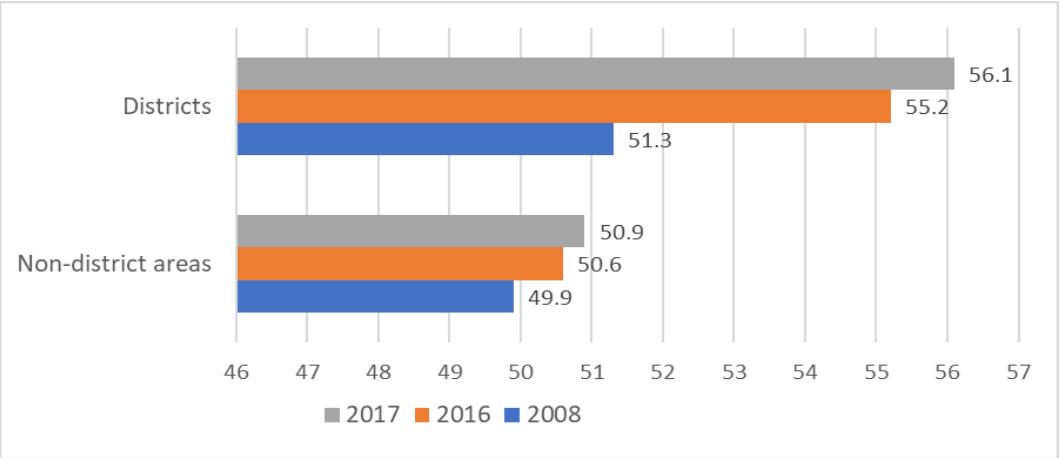
In 2017, the districts, altogether composed of more than 80,000 companies, registered a 4.3% increase in turnover, reaching the threshold of € 760 billion and a remarkable labour productivity. On the other hand, 2018 recorded an increase of only 3.4% due to the slowdown in the economic cycle in the second half of the year (Fig. 1.3; Fig. 1.4) (De Michele, Fumagalli, Galleri, Giusti, Moressa, Palumbo, Sangalli, Saruis, Stoppani and Vitulano, 2018).

Fig. 1.3: Change at current prices in turnover trend in 2017 (%; Median values)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Fig. 1.4: Value added per employee in labour productivity (Thousands of euros at current prices; Median values)



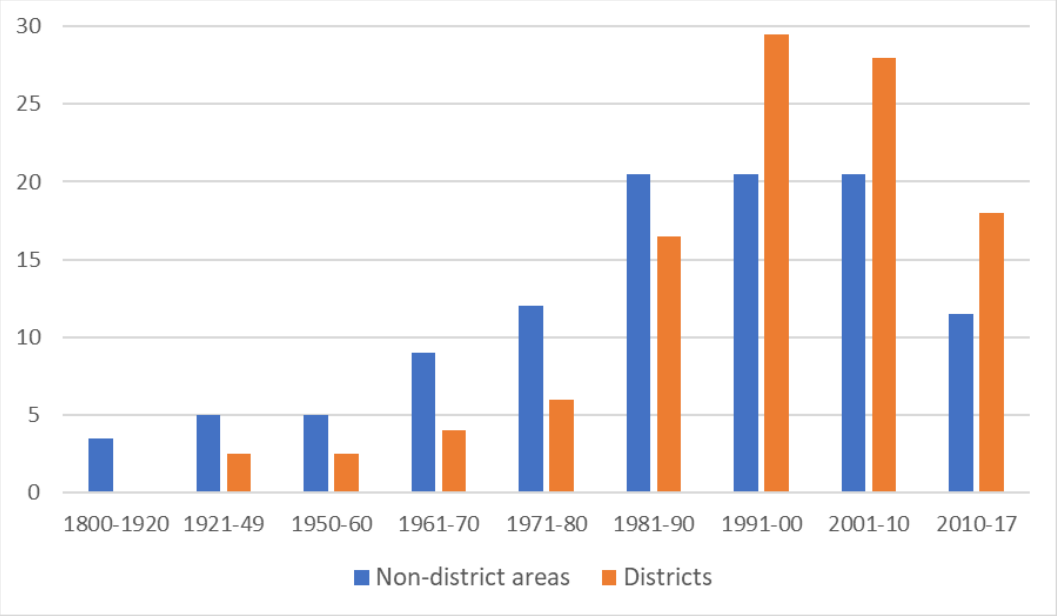
Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

In 2017 there was also a strengthening of overall profitability, which benefited from the further reduction in the cost of debt, thus bringing the ROE to significantly higher levels than those of ten years ago.

Growth and renewal have also been sponsored by capital and foreign investments, thanks to which foreign multinationals have increased their presence within the districts, usually through acquisitions.

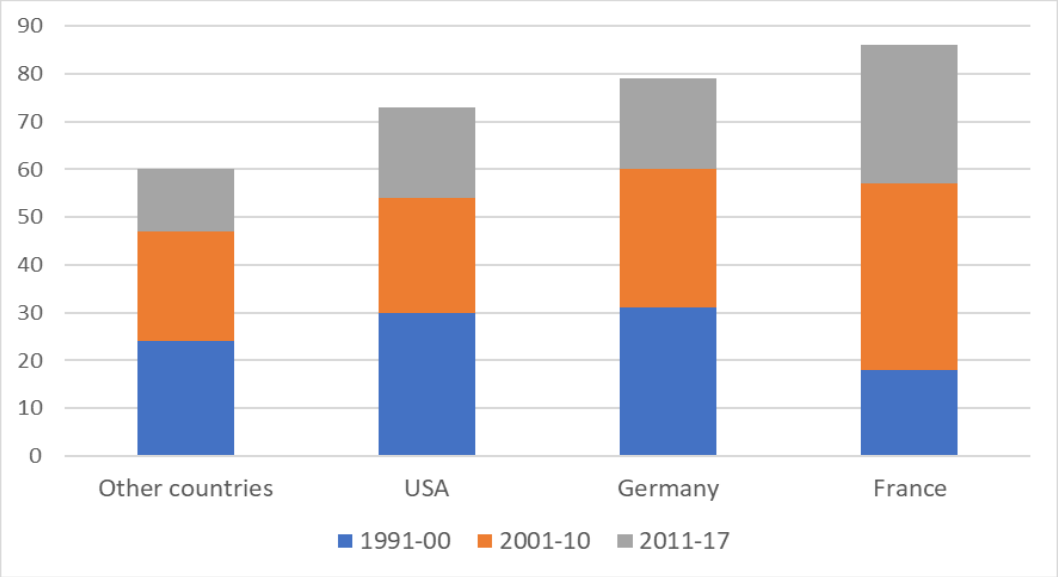
In any case, after 2001, entry into the districts has slightly exceeded 28%, while in non-district areas it is difficult to reach 11%. This predominance is still in force in this decade, even if in a lower percentage, mainly due to international competition and the 2009 crisis. (Fig. 1.5; Fig. 1.6) (De Michele, Fumagalli, Galleri, Giusti, Moressa, Palumbo, Sangalli, Saruis, Stoppani and Vitulano, 2018).

Fig. 1.5: Share of foreign-controlled companies by location and fate of entry (%)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

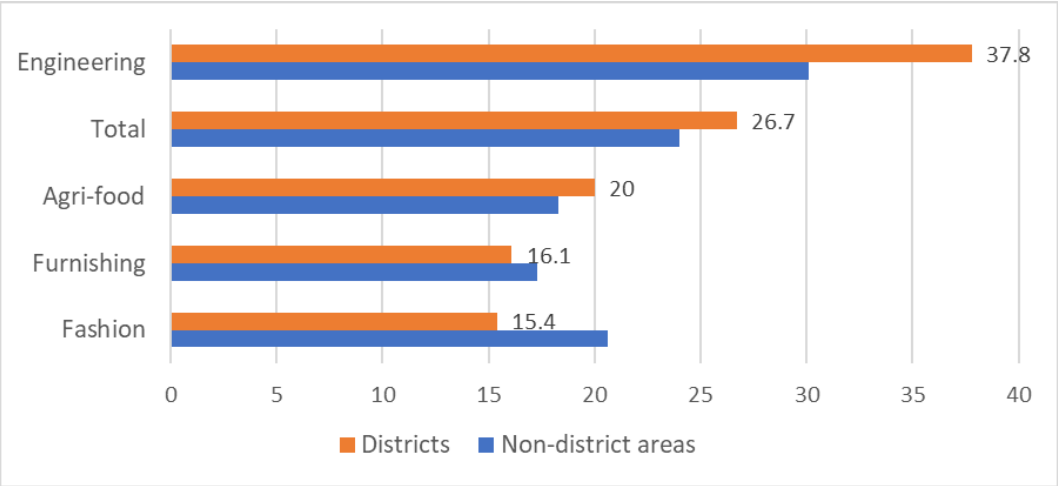
Fig. 1.6: Share of foreign-controlled companies in districts after 1990 by nationality of investors (%)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

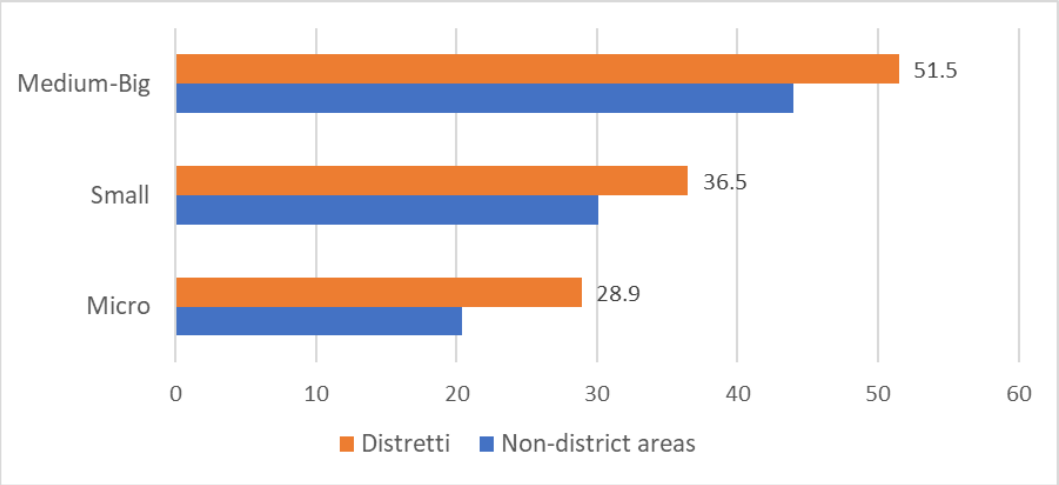
Among the elements of innovation and innovative transformation, we find the technological factor 4.0. This aspect is prevalent in district areas, registering shares of 26.7%, reaching a peak in the mechanical sector, stimulated by medium and large companies. In this context, even among small and micro enterprises significant percentages are recorded (respectively 36.5% and 28.9%) thanks to the absorption and imitation capacity of other companies (Fig. 1.7; Fig. 1.8) (De Michele, Fumagalli, Galleri, Giusti, Moressa, Palumbo, Sangalli , Saruis, Stoppani and Vitulano, 2018).

Fig. 1.7: Share of companies adopting 4.0 technologies by macro sector (%)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Fig. 1.8: Share of companies adopting technology 4.0 by size (%)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Tab. 1.1: Dimensional characteristics of companies belonging to districts and non-district areas

	Districts				Non-district areas			
	N. Company closed sample 2015-17		Turnover 2017		N. Company closed sample 2015-17		Turnover 2017	
	Units	Comp.%	Mld €	Comp.%	Units	Comp.%	Mld €	Comp.%
Micro	8,878	44.7	10.6	4.5	34,346	55.1	39.4	7.4
Small	7,580	38.1	38.1	16.1	20,815	33.4	99.7	18.8
Medium	2,722	13.7	60.8	25.8	5,869	9.4	130.9	24.7
Big	701	3.5	126.3	53.6	1,278	2.1	259.3	49.1
Total	19,881	100	235.8	100	62,308	100	529.3	100

Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Tab. 1.2: Sectoral characteristics of companies belonging to districts and non-district areas

	Districts				Non-district areas			
	N. Company closed sample 2015-17		Turnover 2017		N. Company closed sample 2015-17		Turnover 2017	
	Units	Comp.%	Mld €	Comp.%	Units	Comp.%	Mld €	Comp.%
	19,881	100.0	235.8	100.0	62,308	100.0	529.3	100.0
Total, of which:	6,037	30.4	59.0	25.0	6,240	10.0	46.4	8.8
Fashion system, of which:	1,428	7.2	10.4	4.4	1,168	1.9	7.4	1.4
Clothing	1,271	6.4	9.3	3.9	1,049	1.7	13.5	2.5
Footwear	1,256	6.3	10.1	4.3	350	0.6	2.9	0.6
Tanning	652	3.3	5.8	2.4	100	0.2	0.8	0.2
Goldsmith	527	2.7	9.3	3.9	198	0.3	1.4	0.3
Knitwear	375	1.9	2.8	1.2	229	0.4	3.1	0.6
Distribution	206	1.0	2.8	1.2	2,514	4.0	13.5	2.5
Leather	205	1.0	2.8	1.2	379	0.6	2.7	0.5

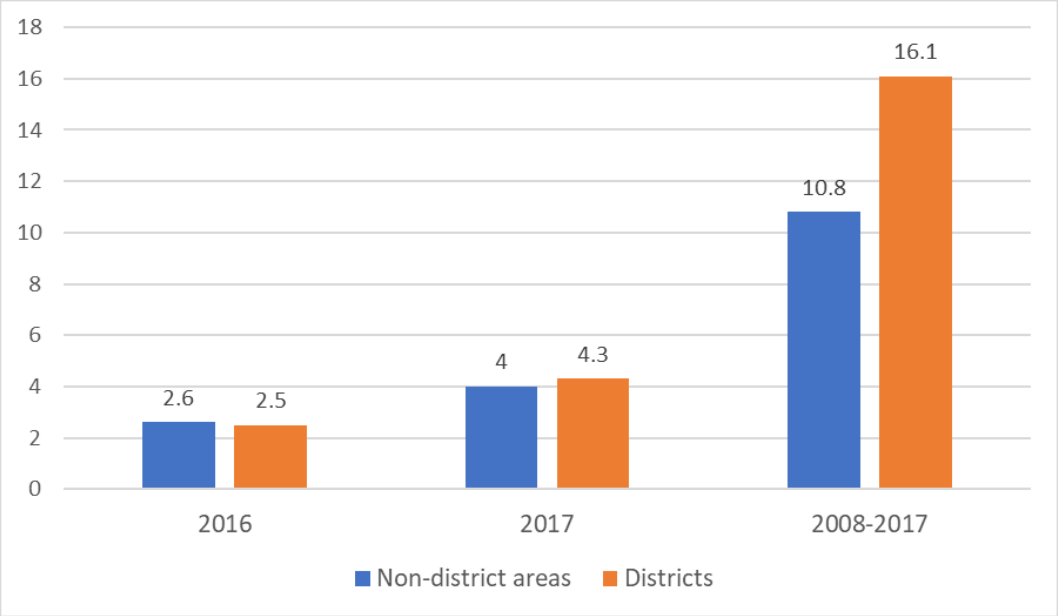
Eyewear	86	0.4	5.8	2.4	46	0.1	0.6	0.1
Design	29	0.1	0.1	0.0	207	0.3	0.5	0.1
Mechanical engineering, of which:	5,942	29.9	70.2	29.8	30,642	49.2	221.2	41.8
Mechanics	3,929	19.8	51.9	22.0	9,158	14.7	81.9	15.5
Metal products	1,577	7.9	8.3	3.5	12,871	20.7	54.8	10.3
Metallurgy	237	1.2	8.8	3.7	799	1.3	29.2	5.5
Electronics	199	1,0	1.2	0.5	7,814	12.5	55.3	10.4
Agri-food, of which:	3,549	17.9	60.2	25.5	9,317	15.0	83.3	15.7
Food	1,335	6.7	33.5	14.2	3,750	6.0	44.6	8.4
Agriculture	1,026	5.2	7.2	3.1	1,662	2.7	9.3	1.7
Distribution	887	4.5	15.5	6.6	3,566	5.7	25.2	4.8
Drinks	301	1.5	3.9	1.7	339	0.5	4.2	0.8
Home system, of which:	2,843	14.3	25.3	10.7	5,103	8.2	26.5	5.0
Furnishings	1,508	7.6	11.2	4.8	1,553	2.5	7.0	1.3
Construction products and materials	625	3.1	6.2	2.6	1,406	2.3	5.7	1.1
Metal products for the home	378	1.9	2.4	1.0	1,252	2.0	4.9	0.9
Distribution	204	1.0	1.2	0.5	417	0.7	1.7	0.3
Domestic appliances	77	0.4	4.0	1.7	165	0.3	4.8	0.9
Lighting systems	51	0.3	0.2	0.1	310	0.5	2.4	0.5
Intermediate goods, of which	1,228	6.2	16.8	7.1	7,259	11.7	68.7	13.0
Rubber and plastic	808	4.1	8.0	3.4	3,311	5.3	28.8	5.4
Wood and wood products	174	0.9	1.4	0.6	1,889	3.0	6.2	1.2
Paper products	147	0.7	5.3	2.2	1,310	2.1	16.9	3.2
Chemistry	77	0.4	1.7	0.7	583	0.9	14.6	2.8

Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

In 2017 the sectors of the Italian districts registered a productive development, except for the fashion system, only slightly active (+0.7%). Textiles, knitwear and footwear recorded substantial sales stability, while a slight increase in profitability was shown by eyewear and clothing. In contrast, goldsmith companies (+6.2%) and leather goods (+9.3%) were particularly dynamic. On average, in the last decade, district entities have registered an increase of around 5% in the turnover trend, with the predominance of agri-

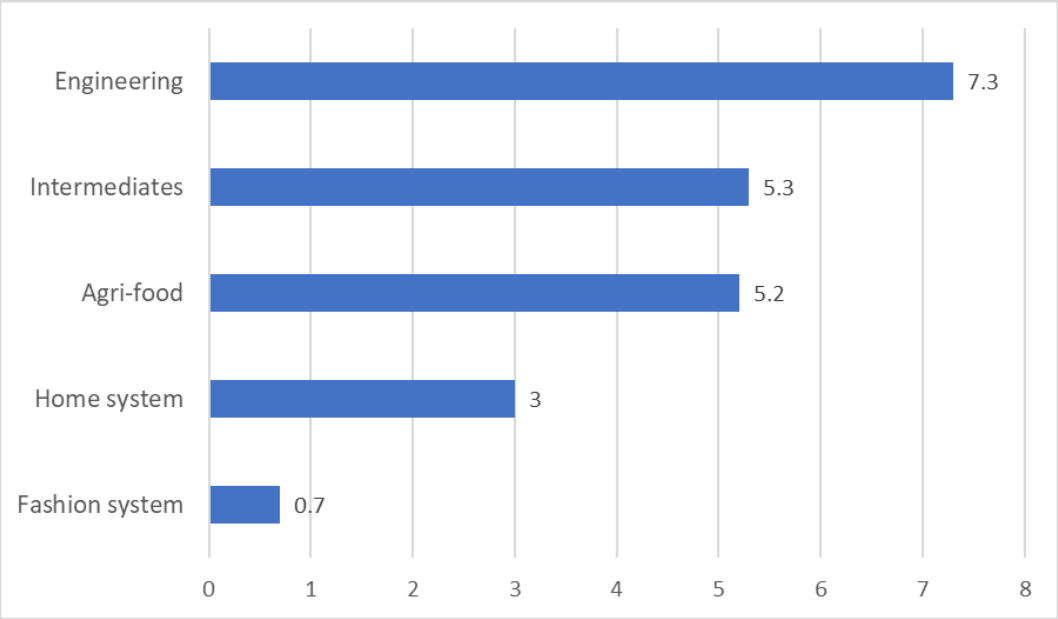
food, intermediates and fashion system sectors, which respectively registered a growth of 35.2%, 18.7% and 14.9% (Fig. 1.9; Fig. 1.10; Fig. 1.11) (De Michele, Fumagalli, Galleri, Giusti, Moressa, Palumbo, Sangalli , Saruis, Stoppani and Vitulano, 2018).

Fig. 1.9: Comparative evolution of turnover (% at current prices; Median values)



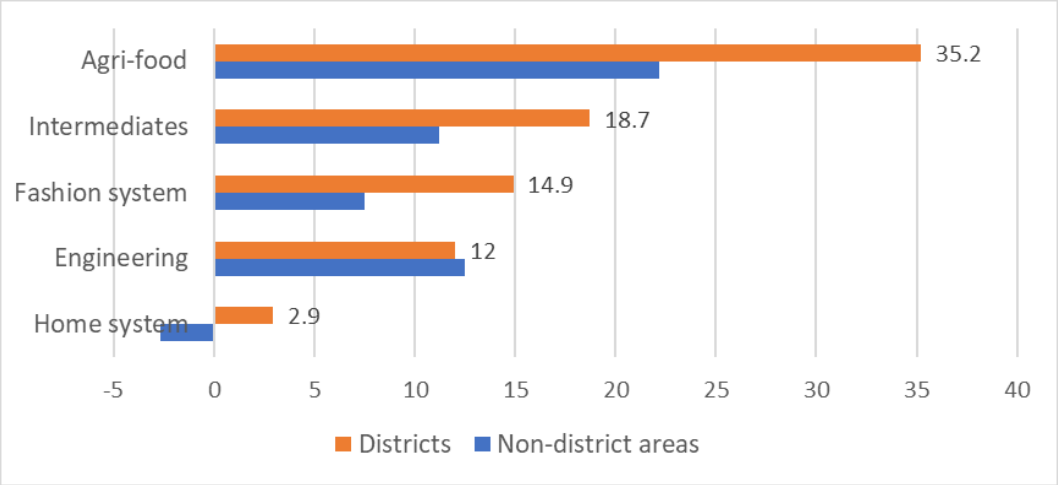
Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Fig. 1.10: Turnover evolution in districts in 2017 (% at current prices; Median values)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Fig. 1.11: Turnover evolution between 2008 and 2017 by supply chain (% at current prices; Median values)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

The "Economic and Finance Report of the Industrial Districts" offers a ranking of the best district areas, based on turnover and its trend, on profitability and on exports.

The ranking of the top 20 districts shows a predominance of the metalworking sector, followed by the agri-food market, then followed by the fashion sector and finally by the specialization in rubber and plastic (Tab. 1.3).

Implementing a geographical and no longer sectoral analysis, we see how the North predominates with a total of sixteen districts, followed by central and southern Italy respectively with two districts (De Michele, Fumagalli, Galleri, Giusti, Moressa, Palumbo, Sangalli , Saruis, Stoppani and Vitulano, 2018).

Tab. 1.3: The best districts depending on the performance of growth and profitability

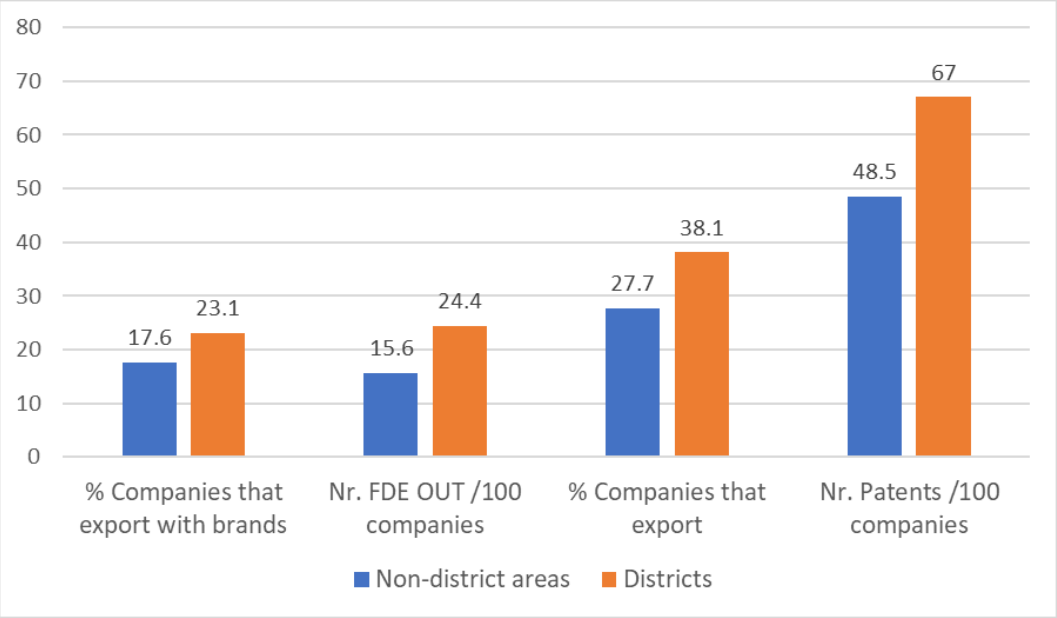
	Grade 0-100	Var. % Turnover		Var. % Export		EBITDA (%)	
		2008 - 2017	2017	2008 - 2017	Jan-Sep 2017	2017	Differences 2017 - 2016
1. "Gomma del Sebino"	85.0	33.5	13.9	74.9	11.7	10.2	-0.5
2. "Pelletteria e calzature di Firenze"	77.9	66.6	7.0	106.0	11.6	7.0	0.6
3. "Dolci di Alba e Cuneo"	76.5	49.8	3.7	46.9	5.6	11.4	0.0
4. "Termomeccanica Scagliera"	75.6	26.2	8.5	27.1	7.5	8.6	0.1
5. "Meccatronica di Reggio Emilia"	74.7	18.0	9.5	25.1	7.0	8.4	0.6
6. "Metalli di Brescia"	73.4	9.4	9.5	-0.4	13.6	9.5	0.1
7. "Vini dei colli Fiorentini e Senesi"	72.7	33.2	4.7	65.6	4.5	10.9	-0.3

8. "Meccanica strumentale di Vicenza"	72.2	23.5	8.2	19.8	3.6	9.6	0.0
9. "Meccatronica dell'Alto Adige"	72.2	32.9	7.1	75.4	6.9	7.8	-0.1
10. "Prosecco di Conegliano-Valdobbiadene"	71.1	100.8	5.8	182.7	10.9	7.8	-1.1
11. "Industria meccano-calzaturiera di Vigevano"	70.9	27.6	5.0	21.7	2.2	10.8	2.6
12. "Occhialeria di Belluno"	70.9	42.3	2.8	82.3	-3.5	13.5	1.9
13. "Meccatronica del Barese"	70.8	15.3	5.1	52.5	5.3	9.8	0.8
14. "Materie plastiche di Treviso, Vicenza, Padova"	70.4	21.3	6.0	44.8	5.3	9.6	-0.3
15. "Macchine agricole di Padova e Vicenza"	69.9	35.3	9.8	49.3	0.2	8.2	-0.5
16. "Alimentare di Avellino"	69.2	29.0	3.0	61.4	9.7	8.2	2.0
17. "Meccanica strumentale del Bresciano"	68.7	15.3	7.6	18.8	3.8	8.6	0.6
18. "Metalmeccanica Lecchese"	68.5	5.3	7.9	20.3	3.0	11.0	-0.2
19. "Meccanica di Trento"	68.4	19.0	6.0	20.3	13.2	8.5	0.0
20. "Macchine per l'imballaggio di Bologna"	68.1	28.0	6.6	33.0	7.3	8.0	-0.2

Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

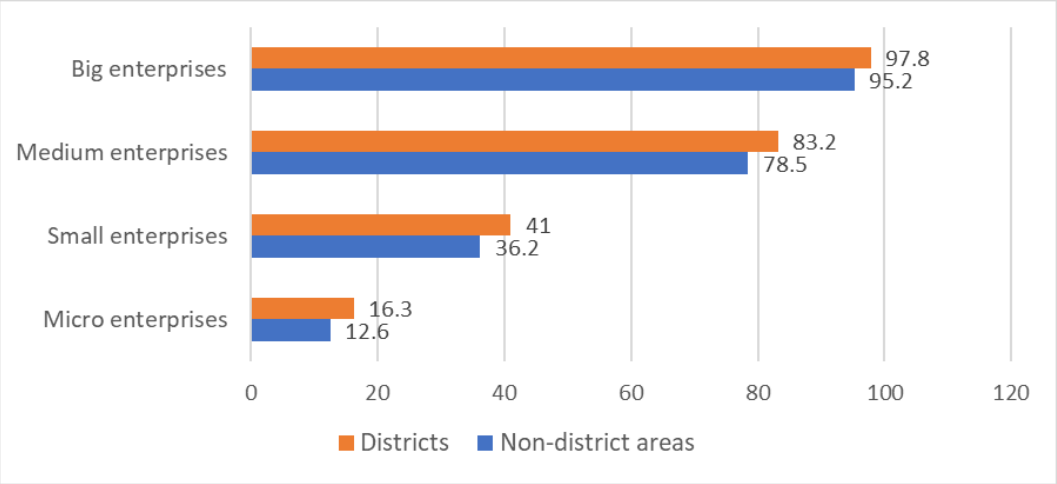
The fact that districts are more productive and efficient than non-district areas originates from a circulation of intangible and immaterial assets, such as strategies, tacit knowledge and information. Compared to non-district areas, the productive fabric in industrial districts seems to have a better performance supported by a regulation of relations and processes along the value chain (De Michele, Fumagalli, Galleri, Giusti, Moressa, Palumbo, Sangalli , Saruis, Stoppani and Vitulano, 2018).

Fig. 1.12: The strengths of industrial districts: FDIs, registered international brands, exports and patents applied to the European Patent Office (EPO)



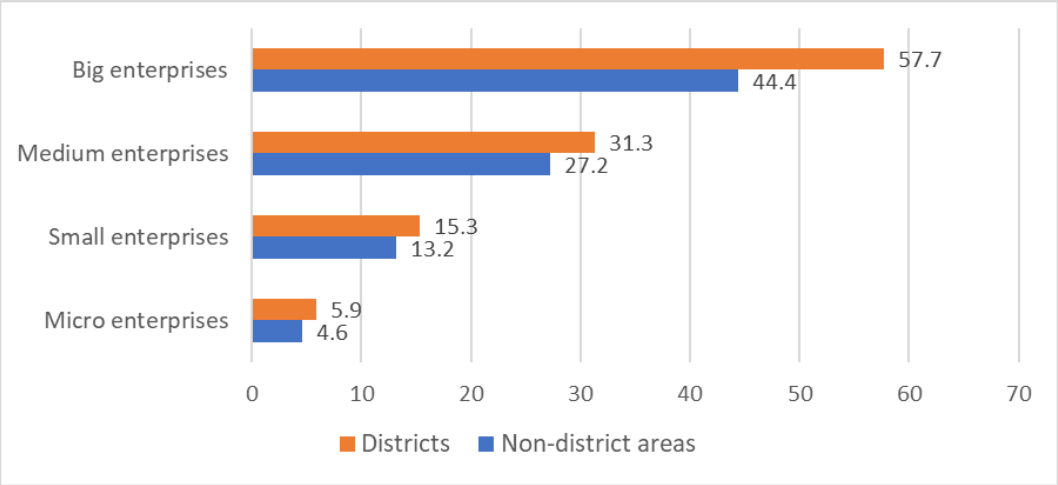
Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Fig. 1.13: Share of companies carrying out export activities (%)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Fig. 1.14: Share of companies exporting with brands (%)



Source: Intesa San Paolo Integrated Database (ISID). Intesa San Paolo, *XI Rapporto Economia e Finanza dei Distretti Industriali*, Direzione Studi e Ricerche, 2018.

Contributing to the evolution of turnover, there is an increase in exports with registered brands, foreign subsidiaries and an expansion of patents within the district areas, in particular thanks to the presence, dissemination and sharing of knowledge on the end markets (Fig. 1.12; Fig. 1.13; Fig. 1.14) (Coltorti, Barbieri, Dei Ottati, Fontana, Gagliardi, Lamorgese, Mauriello, Mio, Pozzana, Resciniti, Rullani, Russo, Testa and Trigilia, 2015). The benefits deriving from the reduction of costs and from the Made in Italy production and product quality have further contributed to achieve an international competitive advantage (De Michele, Fumagalli, Galleri, Giusti, Moressa, Palumbo, Sangalli , Saruis, Stoppani and Vitulano, 2018).

Analyzing on a territorial scale, we note that the district areas with significant quotas in the exported Made in Italy are all located in the northern regions (Veneto, Piedmont, Lombardy and Tuscany), while the regions with shares below 4% (residual) are Campania, Lazio, Abruzzo, Sicily, Basilicata, Trentino Alto Adige and Sardinia. The reasons behind the weak internationalization of the Southern districts can be the high presence of small companies, the quality of the products and the re-use of a part of these products as productive inputs in the entrepreneurial activities of other regions (Coltorti, Barbieri, Dei Ottati, Fontana, Gagliardi, Lamorgese, Mauriello, Mio, Pozzana, Resciniti, Rullani, Russo, Testa and Trigilia, 2015).

1.2.3 Internationalization and innovative evolutionary trends

In the last period, companies have been called to relate inside a competitive environment conditioned by internationalization, new technologies, new players and competitive elements such as knowledge and innovation.

According to Garofoli, an obstacle for the district system was the internal environment that was not very complex and competitive, which characterized the last evolutionary period of the Italian economy, weakening the structure and delaying strategic, organizational and productive innovation (Garofoli, 2003). Other difficulties may arise from those factors that offered an advantage to the district reality in the 1970s and 1980s. In fact, too static factors such as cooperation, tacit knowledge, and culture could slow down the development of the district and the cluster.

The 80s and 90s correspond to the first phase of globalization, which implies the need to begin to understand the positioning of the final companies within the market, the internal territorial orientation, the orientation with foreign markets, the relationship with the distribution channels, the fragmentation of tasks between subcontractors and end companies, and the ability to carry out exports (Sforzi and Lorenzini, 2002).

International openness is an extremely sensitive subject, especially in the Italian context, threatened by an high entrepreneurial microsomia and by an insufficient inclination to venture capital, to investments in R&D and to the formation of new workforce. The low level of innovation can be attributed to low competitiveness, reduced size and high fragmentation of production.

The growth strategies refer to the specificity of small businesses, in fact, the Italian production context has a tendency to concentration in niche markets (Becattini, 1998).

If towards the end of the 1980s the Italian district companies that internationally carried out activities focused on expanding exports to the most developed countries; ten years later the district and entrepreneurial fabric began to develop the idea of locating the production phases in emerging countries or in any case at low labour costs. In fact, one of the plausible strategies is the delocalization of production in developing countries, mainly carried out by large and medium-sized companies.

However, paying attention to the work proposed by the Italian Districts Federation associated with Unioncamere and Unionfiliere, there is a tendency to limit the delocalization by enhancing in parallel the local supply networks, which are more reliable and predictable than the foreign ones. In fact, the localized strengthening in the district

areas guarantees elasticity and flexibility, punctuality of deliveries and above all reduces the presence of residual orders and any repairs typical of the delocalized reality.
A second strategy that, according to Ricciardi, allows for the creation of relational R&D connections are the business networks (Ricciardi, 2013). These networks are born through the reorganization of the production chain by leading companies, through the qualitative and competitive selection of "collaborators". The business networks vary their organization, in order to maintain an effective position within the district regions and the supply chains, accentuating relations between companies, research or training institutions, innovation and/or technological poles. In this way, local businesses grow by achieving benefits without operations aimed at expanding their size.
The firms that carry out the role of governance within the international production networks can implement sub-supply relationships directed to the acquisition of control, or direct investments aimed at producing near the final target markets (Tattara, Pitingaro and Volpe, 2001).

However, it has been pointed out that delocalization, de-specialization and the reduction of SMEs have eroded the district and their organizational and productive form, already in slight decline due to the traditional sector specialization and the small size of the companies.
Mainly in Italy, we continue to think of a district as an almost exclusively productive and manufacturing association; despite the district nature is the ideal basis for the creation of learning mechanisms aimed at revitalizing innovation (Brusco, 1989).
Currently, therefore, the districts, in order to survive, should undertake integrative relationships through inter-district productive networks focused on the growth of new specialized industries and aimed at supporting the addressing of industrial phases towards highly technological and innovative sectors. It is therefore agreed that they still play an essential role in the progress of the Italian industrial fabric, thanks to their innovative capacity.
The affirmation of this model of development and innovation within advanced economies was contributed by the presence of a production chain deriving from the integration of different production phases, from the innovative continuity imparted by entrepreneurial work and from the role of the territory as a resource and cognitive institution in the production of knowledge. The imperative behind competition and competitive advantage

in global markets is innovation, generated by learning models and by the transfer of knowledge.

Nowadays, the innovation factor is closely intersected with that of internationalization, and in a sense, they reinforce each other. This positive and direct relationship is explained by the continuous and progressive rotation of the products offered by the company due to international competitiveness, which consequently increases the level of costs, pushing research towards wider markets and at the same time raising the risk but also the return on capital (Tattara, Pitingaro and Volpe, 2001).

In the last decade, following these competitive strengthening mechanisms based on knowledge and innovation, the Italian economic context has seen an increase in exports, in particular promoted by companies already located in global markets, which has contributed to improve stability and to qualify the distribution networks located in the international sphere (Velardi, D'Amico, 2006).

In this context, the Italian district firms are heading towards new foreign direct investments and new forms of internationalization, thickening the relationships with institutions, public bodies and financial institutions, propellants of knowledge and productive innovation.

1.3 The concept of clusters

1.3.1 The role of innovation as a source of recovery

As we have already seen, due to the changes in the global competitive scenario, such as the emergence of Asian countries at a global level and their low-cost policies, the traditional districts have encountered significant difficulties.

In this situation, the district, finding itself in a maturity state, requires innovations that allow to achieve an international competitive advantage. As a result, these local realities have begun to follow innovative paths in order to adapt to the new scenario, through processes of delocalization, business network, technological innovation and knowledge transfer.

In these difficult to understand evolutionary contexts, another form of business aggregation is beginning to take an increasing position.

This organizational model called cluster is nothing more than a presence of actors, both private and public, who mainly exercise their knowledge intensive activities. Based on innovation and research, the clusters are oriented towards the knowledge society, focusing on the difficulties ingrained in the Italian context, such as the productive specialization in low-tech manufacturing sectors and the lack of relations between companies and institutions aimed at the diffusion of technology and knowledge (Porter, 1998).

It is important to emphasize that in the literature, this term has been introduced in the works of Michael Porter as a literal translation of the concept of district. Since it is difficult to establish a precise dividing line between the district and clustered concept, it is advisable to proceed with the enunciation of the concept of cluster and subsequently identifying the differences with respect to the district model.

The cluster, as well as the district, is a term aimed to identify economic and industrial agglomerations characterized by important innovative and technological elements (Cesaroni and Piccaluga, 2003). However, Rullani highlights how the term "cluster" is more appropriate to define agglomeration economies, more focused on cognitive elements of learning, which make the local area extremely attractive for other companies, which, increasing the presence of economic activities, reinvigorate the advantages of local concentration (Rullani, 2000).

Porter defines the cluster as a "geographical ensemble of interconnected companies and institutions in a given territory. The cluster encompasses a set of industries and other different entities that are fundamental for the competition." (Porter, 1998). In this perspective, the advantages do not only derive from the size of the companies inside the area, but also and above all from its ability to create networks with other companies. The essentiality that the internal and external vision of the company assumes influences the attention dedicated to the "vertical" dimension of the distribution channels and to the "lateral" dimension of the companies interested in the circulation of knowledge and technologies.

This geographical concentration, to achieve a competitive advantage, must implement the activities in order to effectively combine determining factors such as the strategies of the clustered companies and their productive factors, the vertical and horizontal relationships, the market structure, the national endowment of determined infrastructures of various nature, the cultural milieu, as well as the external industries, the government, the work of

public and private institutional and administrative bodies, the characteristics of the cultural system and the chance factor (Castellet and D'Acunto, 2006).

According to Porter, and subsequently supported by Sforzi, the cluster is able to transform the factors of national competitive advantage within a local region. This model, like the district, competitively benefits from geographical proximity, understood as geographical nearness, as the supply of inputs is more advantageous if it is limited to the local area. Criticisms of Porter's cluster analysis reveal too much immobility to be able to explain the productive and relational dynamism within clusters.

According to other authors, such as Huggins and Cooke, the cluster is nothing but an evolutionary consequence of the industrial district. They identify this evolutionary reality as “companies located in a close area linked by vertical and/or horizontal relationships, also involving infrastructure provisions and basing the nature of this connection on economic development and on the combination of competition and collaboration in this particular sector” (Cooke and Huggins, 2001). The authors focus on the role of technology and knowledge transfer institutions, which are extremely fundamental for value generation within the area. It follows that the cluster has evolved with respect to the district due to its greater breadth and openness, regarding the businesses located in that territory and the territorial extension.

According to this new thought, the competitiveness of these clusters derives from the capability to combine static and dynamic factors (integrating factors of the external environment with the objectives and resources of the local subjects) (Lazzeroni, 2004).

The cluster is therefore aligned with the competitive nature of the market and with the drivers of a competitive advantage, focusing on connections capable of transferring and communicating competences, needs, information and innovations.

The clustered model is oriented towards scientific research and direct exchange of related results with industrial companies. This agglomeration is closely linked to the territory, but open and flexible to relations between various actors (Becattini and Dei Ottati, 2006). While the districts have progressively evolved from the bottom up, the clusters are nourished by public investments directed at economic development, scientific research, or by the presence of a large company rich in technological and innovative knowledge.

There is hence a progressive change towards a knowledge-based economy, based on the control of knowledge, competences, intangible resources, professional figures and human capital (Rullani, 2000; Camuffo and Grandinetti, 2006).

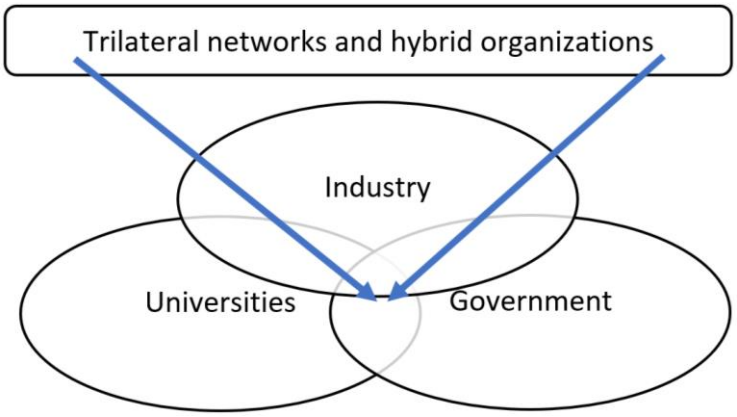
In the current context, and more precisely within the most developed realities on a global level, the cluster is seen as a sustaining factor for innovation, focusing precisely on investments destined for innovation, specialized human capital and on how to increase competitiveness and competitive success.

1.3.2 The birth and the drivers of clusters

Questioning on what the determinants of the birth of a cluster may be, let us dwell on the Dorfman's thought, according to whom the main driver of localization in a given place is to be found in the presence of exceptional resources, new ideas, knowledge, training, professional figures and highly qualified entrepreneurship, made possible by institutions such as universities, research institutes and local policies aimed at supporting businesses (Dorfman, 1988). Other drivers come from the definition of "learning regions" introduced by Lundvall, which indicates territories characterized by frequent dynamics, with a necessary and close collaboration at the local level. This collaboration sees as protagonists different actors that are local consulting and services businesses, financial institutions, universities, research bodies, public bodies and lastly the final users of the technology.
The direction of the industrial economy, towards the minimization of transitive costs through interpersonal relationships and towards the coordination of individual companies that favours the market, have enormously contributed in recent years to the creation of clustered territorial units.

In this new millennium, the cluster becomes a "supply chain of knowledge" and of technological learning, in which the actors promote local development, since the economic model is based on the competitive advantage deriving from the circulation of technology and knowledge and by their industrial applicability.
In this context, it is remarkably interesting to analyze the local development model of the "triple helix", stating that the success of the clusters is based on the relations between universities, government and companies (Etzkovitz and Leydesdorff, 2000).
The Triple Helix model allows us to understand the conditions that allow the creation and evolution of a cluster, such as the presence and hybridization of the three sub-systems that will be described later, willing to change their nature and organization, in order to reach a certain level of efficiency in the development of the clustered area (Fig. 1.15) (Etzkovitz and Leydesdorff, 2000).

Fig. 1.15: "Triple Helix" Model



Source: Etzkovitz H., Leydesdorff L. (2000), "The Dynamics Of Innovation: From National System And "Mode 2" To a Triple Helix Of University-Industry-Government Relations", *Research Policy*, vol. 29, n. 2, Elsevier B.V..

These relationships that are created are not static, but rather they are in continuous transition and evolution in a spiral model that varies according to the capitalization of knowledge. These relationships thus allow the creation of co-evolutionary processes centered on technical-innovative development dynamics.

The companies are the actors dedicated to the realization of synergistic collaborations. This activity is increasingly threatened by the presence of numerous competitors, greater complexity and other obstacles such as high costs.

The government and the public bodies define the regulatory and financial framework to support the progress of the localized territory. Policies favourable to competitive growth are typically found in mature and stable regions; while, in the emerging clusters, strategies aimed at technological and innovative progress emerge (Etzkovitz and Leydesdorff, 2000).

Public intervention must be addressed towards policies related to research funding, infrastructural financing and circulation of technologies, knowledge and innovations. In this way, public bodies specialize in recovering that difference, called innovation gap, between the innovations actually carried out in a given location or system and the level of innovation achievable in the case that sectoral and market failures were non-existent (Rolfo and Calabrese, 2006).

Universities and the local education system in general (together with research centers) represent a scientific support function, participating in increasingly necessary public funding and representing a training and education function for the local labour force and future cluster managers. These functions make the university environment the main

source of knowledge creation and transfer. In recent years, informal transfer mechanisms are giving way to formal technological management ones that allow the transformation of knowledge into business competences, determining the genesis of entrepreneurial universities.

The universities, as well as the various research institutions, through mechanisms such as patenting and academic spin-offs, therefore carry out an activity aimed at creating new knowledge and valorizing research, which are extremely fundamental in the current knowledge-based economy (Brett, Gibson and Smilor, 1991).

According to Etzkowitz, these institutions must present interdependence with industry and public bodies, an organizational independence, an hybridization that allows the coexistence of the first two conditions, a reflexivity and in particular a capitalization of new knowledge (Audretsch and Lehmann, 2005). The combination of these factors gives life to a productive plant of knowledge and human capital that nourishes the scientific base of the clustered territory, implementing new human resources, reinvigorating relations between companies and research institutes, and developing the technological base of local productive activities (Bonaccorsi and Deraio, 2007).

Among the methods of cognitive development of the universities we even find the introduction of academic incubators. These organizations provide the physical locations, services, advices, competences and know-how to sustain the spin-off companies by developing entrepreneurial initiatives aimed at the new innovative technology (Albert, Bernasconi and Gaynor, 2002).

The industry-government relations depend on the attitude that public bodies take towards the market, focusing on crisis prevention or market failures and on the regulation of the industrial environment.

University-government relations instead depend on the influence of policies on the education system of the local area.

However, the interactions between the three elements depend on which actor is the main driver. For example, in a static model, interactions are directed by a strong government, through top-down theories; while, in a more liberal model, the relationships between each component do not assume an high degree of dependence.

This relationship of “helices” gives life to “an innovative and useful spiraling cycle in order to originate and spread technological learning and knowledge at local level, fuelling, in the medium-long term, the formation of new high-tech entrepreneurial

entities" (Schiavone, 2008). As a result, the three helices take on ever more equal importance, enhancing the importance of the relationships between them.

1.3.3 The differences between districts and clusters

In this current scenario, increasingly characterized by the instability generated by internationalization, companies are obliged to innovate in order to maintain a position in this environment, speeding up innovative processes and consequently increasing costs and risks.

Studying the two models of agglomeration, we see how the district was born from the overcoming of the theoretical concept of enterprise; while the cluster appears as a geographical expressive evolution of different territorial scale, being able to extend from a simple region to an entire nation or supranational (Porter, 1998).

The first term refers to entities of territorial development, where there is an high entrepreneurial concentration and a specialization of the economic sector. The cluster, on the other hand, is nothing but a geographical system, a set of companies and institutions integrated within the territory (Tattara, Pitingaro and Volpe, 2001).

Among the first differences that emerge between these aggregative forms, we have the belonging sector. While industrial district is mainly specialized in manufacturing activities (labour intensive), cluster favours knowledge intensive sectors (Bottinelli and Pavione, 2011).

The former is characterized by information flows, inputs and outputs, thanks to the territorial proximity and to the institutions that generate external economies. The latter is oriented towards a network of interdependent companies, flanked by institutions and bodies related to the production of knowledge, under a single link aimed at generating added value. In clusters, proximity creates a network of relationships aimed at knowledge and new localized technologies, also increasing cooperation between companies located at the same level of the production chain (Dahl and Pedersen, 2004). The relationships in these areas have a greater relational tendency which reduces their complexity and, together with the less accentuated geographical proximity, they make these networks widen.

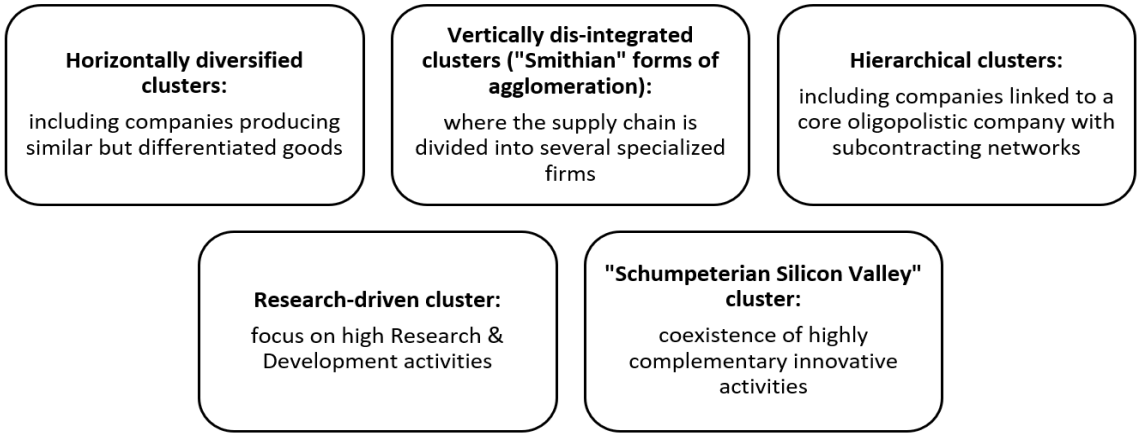
Although the districts are also linked to agglomeration economies, clusters are better suited to these economies by paying more attention to cognitive aspects, such as the generation and transmission of knowledge (Rullani, 2000)

Here, there is another considerable distinction between the district and the clustered areas, that is their level of openness towards the outside. The cluster theorizes about open innovation concepts, changing the ways of creating innovation and new knowledge, no longer seeing it as an in-house mechanism for large companies, but also achievable by specialized SMEs (Chesbrough, 2003). In this way the clusters are characterized by a much more active relationship of the internal and external environment with respect to the district, thus weakening the boundaries of these networks. It follows that concepts such as the internationalization of the supply chain find an easier and more effective strategic application within the clusters.

Another difference that emerges at the organizational level is the importance that the governance structures assume within the cluster. The public bodies located hold a more active, central and present position by offering services, financing new projects, supporting the genesis of new learning and promoting the training of future professional figures (Lazzeroni, 2004).

The classification implemented by Cooke shows us how all clusters, regardless of their strategic organization and nature, base their competitiveness on the cluster-specific resource of geographical contiguity (Cooke, 2005), effectively spreading knowledge and in particular tacit knowledge (Fig. 1.16).

Fig. 1.16: Cluster classification depending on the strategy implemented and the nature of the activities performed



Source: Cooke P. (2005), "Regional knowledge capabilities and open innovation", Research Policy, vol. 34, Oxford University Press.

Chapter II

The Knowledge-focused Economy in Industrial Clusters

In this chapter we will deal with the concept of knowledge and the role it plays in the survival and progress of the economic system, contributing to the improvement in terms of quality, innovative development and competitiveness, particularly in localized areas such as district and clustered ones.

In the current economic and social context, strongly influenced by relationships and by the exchange of knowledge, innovation and economic development must be analyzed through a new approach based on the importance and the order of networks that are the basis for the diffusion of information, knowledge and know-how.

Thus, we will introduce the theories of professor César A. Hidalgo, who interprets economies as networks of relationships with the aim of maximizing the information transferred and the ability to process them. Then, we will concentrate on the presence of knowledge and know-how and on their circulation and accumulation, neglecting individual abilities and projecting attention towards the joint and collaborative capacity and the necessity of individuals to create networks to promote cognitive development (Hidalgo, 2015).

After a presentation of the supply chain of knowledge, extremely vital for qualitative, competitive and innovative development premised by innovation, formation and research supported by policies, we focus on the literature of the concept of knowledge as resource and on its nature, introducing mechanisms of productive and cognitive diffusion such as the spiral model of Nonaka and Takeuchi. From here on we will highlight the existence of a fair variety of knowledge and of the importance of a local collective entity that is able to gather as much knowledge as possible, in order to progress.

Therefore, it becomes necessary to create collaborative networks that guarantee a certain level of socialization and externalization of knowledge, with the aim of internalising it and combining it with the already existing and basic one present on site. Through these mechanisms it will be possible to create new knowledge and know-how to be used in the development processes. (Nonaka and Takeuchi, 1995; Belussi and Pilotti, 2002; Schiavone, 2008).

Afterwards the concept of knowledge is related to the district and cluster theme, highlighting the cognitive and learning dynamics, the drivers and the role it plays in

innovative processes. By transposing the concept of knowledge within these territories, importance is given to the defined area as a social, cultural and economic entity able to relate and transfer peculiar knowledge of this place and in the meantime assimilate it again. In these paragraphs we will analyze the various transfer mechanisms, the protagonists, the organizations and institutions, the role of the leading companies and SMEs within these groups (Albino, Garavelli and Schiuma, 1998; Camuffo and Grandinetti, 2006).

This relationship that is created between knowledge and localized realities will then be deepened, focusing on the models of circulation, absorption, conversion and learning between district companies, extra-border, within district organizations and finally in clustered enterprises (Cohen and Levinthal, 1990; Breschi and Lissoni, 2001; Haas and Hansen, 2003). The future of these local realities depends on their internal capacity to relate to the outside world, creating lasting networks that allow sufficient cognitive assimilation to compete and guarantee innovative success.

2.1 The importance and the order of knowledge networks

In the current economic and social background strongly conditioned by relationships and the diffusion of knowledge, economic development must be analyzed through a new approach centered on the order of increasingly complex networks and on the related circulation of information.

In fact, among the various recent actors who founded their theories on the evolution of order and information growth, professor César Hidalgo excels, who works to explore the mechanisms of these relational networks and their relationships between the various actors in order to allow better use and enhancement of knowledge (Hayek, 1945; Hidalgo, 2015).

The economies, under a current original point of view, are interpreted as real networks of informative relations between different material, social, economic and cultural elements, which make it possible to maximize the information contained and also the ability to develop it by the interested parties. This information processing is also closely linked to the presence of knowledge and know-how, and when it is combined with the ability to gather information it allows for economic, social and cultural growth.

The aim of Hidalgo's work is therefore to create a relational order between products, subjects, institutions and infrastructures in order to allow a continuous production of information.

Taking up the information and cognitive abilities, according to Hidalgo, they can be projected inside the products, being interpreted as a crystallized image of the accumulation of information (Shannon and Weaver, 1963). The product and its economic value are no longer understood as a set of material elements that give it its conformation, but rather as an ordered structure of knowledge and know-how born from the imagination of the subjects who were able to develop specific factors and information within a material process.

An example of the change of approach is the use of the balance of imagination as an alternative to the trade balance of a nation or a region in order to measure the amount of information and knowledge transferred between the various national or regional networks. In this way it is possible to compare the quantity of exported/imported products with the quantity and informative value of knowledge and know-how contained in these crystallized images (BeinHocker, 2005; Hidalgo, 2015).

The economies, understood as nations, regions, industrial areas and their networks, are intended as a collective ecosystem capable of producing knowledge, becoming a true chain of knowledge. These new entities, commonly defined as knowledge and know-how amplifiers, hold the capacity to extend the cognitive and information flows contained in their networks through the reification of information (Eigen, 2013; Hidalgo, 2015).

Among the limits in information accumulation there are the disparate and limited capabilities of the subjects and networks in the transfer and assimilation of knowledge and know-how, which create an important informational inequality and disorder on a global level.

These different capacities are usually incorporated, together with the different amounts of knowledge and know-how that are difficult to copy, within the networks and for this reason they vary from region to region depending on the place where they operate. These limits and these disparities between the various economies derive from the fact that the learning process consists of social mechanisms based on experience and for this reason it introduces a geographical factor conditioning the collection of knowledge and know-how that are tacit and difficult to codify.

Thus, the two main limits of collective capacity in cognitive collection are the need to create networks of relationships that allow a continuous transfer of knowledge and the limited capacity for accumulating knowledge and know-how of individuals, called personbyte. Alongside these obstacles we also find other economic, social and cultural elements such as costs, bureaucratic weight, standards, language, trust and technological progress. These obstacles, and the disparities in these factors due to a geographical bias, influence the capabilities of the various networks in creating complex and sophisticated connections.

However, according to Hidalgo, in accordance with Coase's thoughts, in this recent phase of global development the costs linked to the networks of relationships, which severely limit the subjective ability to gather knowledge and know-how, have been drastically reduced (Coase, 1937; Scott, 1998). This decrease was guaranteed by progresses in the linguistic, transport and communications fields, such as the reduction of their costs, tariffs and bureaucratic aspects and the emergence of new commercial and industrial standards, favouring a greater flux of knowledge between countries, regions or various networks. Thus, we no longer focus on an individual capacity (personbyte), but rather on a limited collective capacity, called firmbyte (Polanyi, 1996).

The international economic development has allowed the creation of new international networks, capable of commercializing products rich in information, mainly assuming a manufacturing nature capable of transferring knowledge and know-how incorporated in its activities. These new international economic networks are essentially based on social networks, which, according to the author, are preferably constituted between subjects, with characteristics, interests and relationships in common and usually linked by the same form of aggregation (Hidalgo and Hausmann, 2009). The relationships of trust have thus allowed further reduction of the costs of relations and transactions and the expansion of networks, avoiding the stipulation of contracts and systems to remedy the low trust level between the parties.

This expansion of relations has permitted a continuous gathering of knowledge and know-how, contributing to a discrete industrial diversity and to the creation of complex products even if in a modest quantity of countries. Moreover, also because of the preferable factors for the birth of the networks that we have described in the previous paragraphs, these relationships are mainly constituted between economies that hold related knowledge and know-how (Hidalgo, Klinger, Barabàsi and Hausmann, 2007).

During his work, Hidalgo introduces five factors as the basis for economic growth during the new millennium and the new phase of global development:

- Physical capital: consisting of the materialization of information, knowledge and know-how. It is defined by the author as the crystal of imagination;
- Human capital: consisting of the stock of knowledge and know-how of people;
- Social capital: consisting of the social capacity to create networks promoting the accumulation of knowledge and know-how;
- Earth: consisting of geographical factors such as the presence of natural resources and infrastructures etc;
- Work: consisting of individuals and their workforce.

Another vital factor for competitive advantage is the need for specialized research, development and training institutions, possibly supported by investors which are able to favour the specific elements for the creation and development of networks (Woolley, Chabris, Pentland, Hashmi and Malone, 2010; Hidalgo, 2015).

According to the considerations previously introduced, the export levels guarantee to give a representation to the quantity of income, knowledge and know-how. In this way, we are also able to understand the quality of institutions, the different types of capital and the connections between the various networks (Kandler, Bleidorn and Riemann, 2008).

In conclusion, the Hidalgo's theory states that in the world economy the simplest industrial activities are spreading more easily, as the complex ones are related to the capacities of the only diversified economies, which diversify products related to those of common use, slowly approaching the income level of the region with that of its economy.

2.1.1 The knowledge supply chain

In this current context characterized by the growing "immaterial" and innovative-technological productive dynamism, knowledge becomes the main factor to face and manage the difficulty and the dynamic changes in the world economy increasingly focused on the drivers of innovation and growth.

The path of innovation, with its interventions on the quality of production, products, processes and organization, increasingly requires important investments aimed at construction processes and above all at acquiring knowledge (Nicolais and Festinese,

2009). For this reason, for the strategies and development plans it is necessary to represent schematically and theoretically the "supply chain of knowledge".

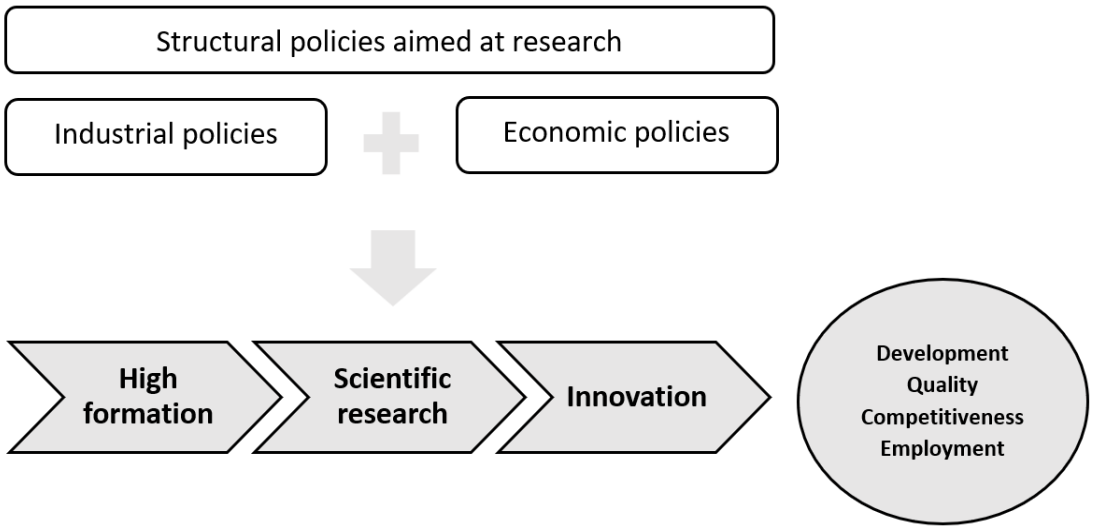
It is believed that this development model, whose essential elements are research, high education and innovation (Albino, Garavelli and Schiuma, 1998), can be seen as a development of the "triple helix" drawn up by Etzkowitz, in which the three components determine shared development dynamics through synergistic interaction between them (Fig. 2.1) (Etzkovitz and Leydesdorff, 2000).

The study of the institutional-entrepreneurial collaborative network (i.e. the relationship between university and industry) makes it possible to understand the different effects on innovative processes depending on the composition and formation of the knowledge communities. These communities arise from the spontaneous relational affairs that are generated in specialized projects and from the complexity of the knowledge that follows in certain research sectors (Boland and Tenkasi, 1995).

The main objective of solving research topics in an innovative way is pursued by informal relationships and exchanges between scientists, scholars and researchers (rather than formal relations between organizations), through non-linear and unstructured paths, due to an immaterial and cognitive exchange among multiple research institutions.

These tacit knowledge networks are permitted by the geographical proximity of the parts, a distinguishing feature of the supply chain and of the community itself (Brown and Duguid, 1990).

Fig. 2.1: Scheme and process of the knowledge supply chain



Source: self-elaboration.

The economic and industrial policies, both structural and research, assume a certain importance within this new chain. In fact, they encourage and protect the relationships between subjects, resources, and territory (De Maio, 2011).

In the context of higher education, attention is focused on developing competences, increasing training and professional investments and on optimizing specialized skills.

Regarding to scientific research, activities related to investments in infrastructure projects are promoted, offering enhancement, dynamism and territorial tolerance.

For innovation, local competitiveness strategies and projects are of vital importance to undertake new mechanisms of progress, attracting further companies, new actors and bringing out social advantages.

The relations undertaken between the supply chain of knowledge and structural policies thus produce a socio-economic growth, with regard to the quality of production and products, the degree of competitiveness and employment (Nicolais and Stampacchia, 2001).

2.2 Knowledge as resource for innovative development

The economic globalization, the increasingly diversified needs of consumers and the ever-increasing dynamism of technological changes give even more importance to the central role that the knowledge resource plays within organizations in order to achieve a lasting competitive success (Cohen and Levinthal, 1990).

According to Polanyi, this resource can no longer be seen as a mere grouping of information derived from objective data that will be assimilated by all subjects equally. This resource appears to be structural, that is nothing more than an abstract based on information generated more or less voluntarily under a procedural perspective from the experiences of certain actors within the local area, going in turn to distinguish the functional property of the knowledge, deriving from competences, capabilities and subjective abilities (Albino, Garavelli and Schiuma, 1998).

Starting from the different degree of accessibility, we distinguish two forms of knowledge:

- Explicit knowledge: a rational and objective knowledge, codified, easily transferable and assimilable, expressible by using a systematically formal language;

- Tacit knowledge: a characteristic knowledge of people, well-rooted, difficult to make formal, transferable and learnable, as deriving from their experiences.

By combining these two characteristics with the individuality/collectivity of knowledge, four different types of knowledge are created (Baumard, 1999):

- Explicit and collective knowledge: composed of rules and laws;
- Tacit and collective knowledge: composed of local community customs;
- Explicit and individual knowledge: composed of technical knowledge;
- Tacit and individual knowledge: representing the "intuitiveness knowledge".

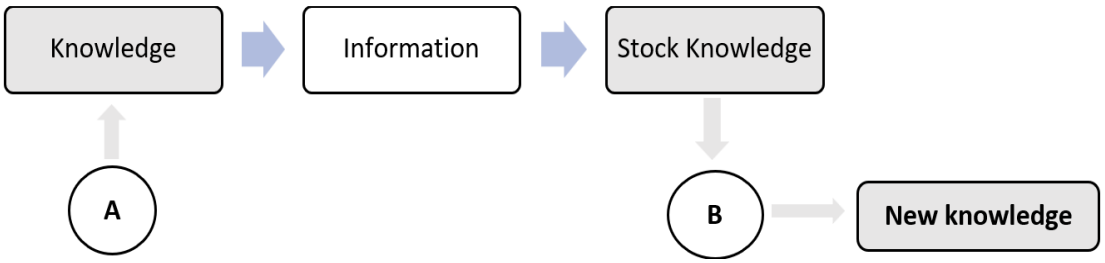
One of the most important features of this source of competitive advantage is not to run out over time, but rather it is presented as a cumulative asset, increasing a stock of knowledge that is already owned (Foray, 2006). It is not always easy to absorb and assimilate, particularly when this source is different or at least distant from stock knowledge.

Since knowledge is the determining factor for achieving and maintaining competitive advantage, numerous researches have been conducted, focusing on different aspects of production, such as the appropriation and dissemination of knowledge. Researchers like Levinthal, March and Szulanski have been paying attention to learning processes (Levinthal and March, 1993; Szulanski, 1996); other scholars, such as Nonaka and Takeuchi in particular, have focused on knowledge creation (Nonaka and Takeuchi, 1995); while others, including Zander and Kogut, have emphasized the importance of knowledge transfer and reproduction (Zander and Kogut, 1995). In this way, the unit of analysis has passed from individual level to organizational, regional and national level (Asheim and Isaksen, 1996).

At this point, to assimilate the evolutionary path of knowledge, the work of Nonaka and Takeuchi appears essential (Nonaka and Takeuchi, 1995).

The assumption from which the study was generated is that knowledge becomes information when it is outsourced from a subject, and that it becomes knowledge again when it is received by the counterparty and consequently integrated with its stock knowledge (Fig. 2.2).

Fig. 2.2: The transfer of knowledge



Source: Nonaka I., Takeuchi H. (1995), *The Knowledge Creating Company*, Oxford University Press.

Being the knowledge creation like something more complicated than a mere collection of information, it is clear that it is appropriate to talk about organizational knowledge creation, referring to a new and diversified innovative approach.

This approach faces two dimensions, distinctly analyzed by bringing out a circular image of knowledge (Nonaka, Toyama and Konno, 2000):

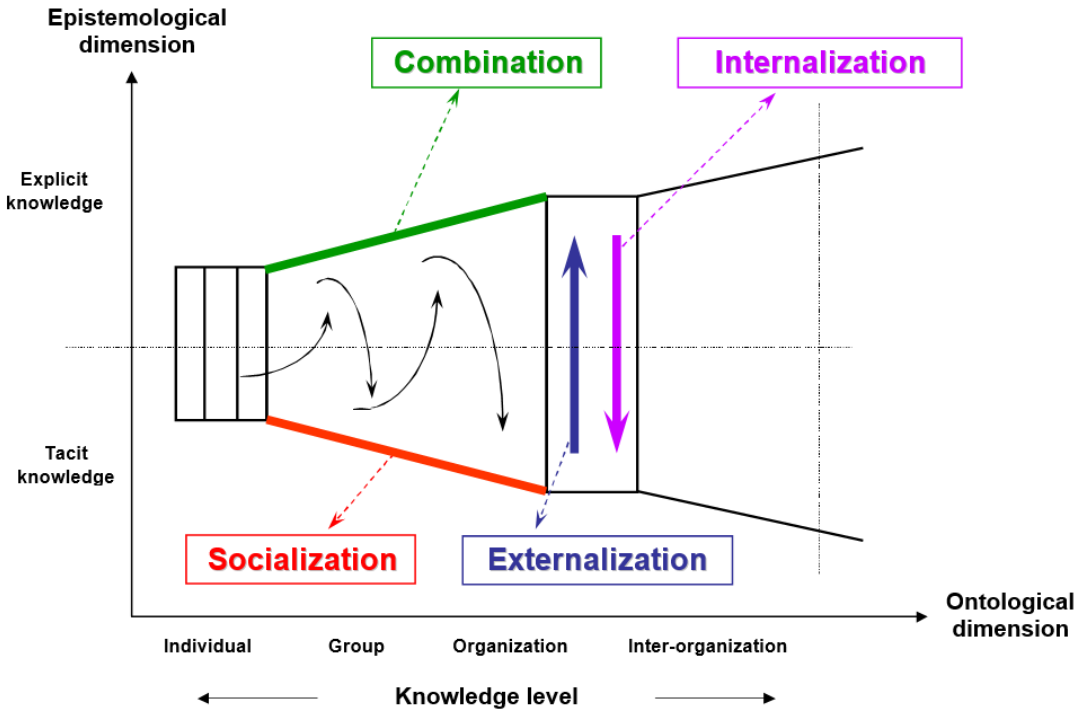
- Ontological dimension: which treats the different levels of actors, such as individuals or organizations, interested in the productive processes of knowledge. The knowledge originates with the introduction of new solutions by the actors operating in a territory characterized by a context and facilitating factors. Subsequently these solutions are transferred to all organizational stages, internally and externally, transforming the organizational apparatus into a veritable amplifier of individual knowledge (Nonaka and Takeuchi, 1995). The knowledge that is created, traces the inverse process, which reduces it to the individual dimension, to then be further recombined giving rise to a new cyclical path;
- Epistemological dimension: which expresses the differentiation and interaction existing between tacit and explicit knowledge. This vision, unlike the previous one, sees the knowledge management as the conversion that allows the implementation of relationships between tacit knowledge (personal and subjective) and explicit one (impersonal and objective).

Even if analyzed individually, they concretely relate to each other continuously, giving a more spiroidal than circular representation.

In the spiroidal model called SECI (Nonaka, Takeuchi and Katsuhiro, 1996), the four interactional procedures between individuals and organizations are represented at the base of the generation and transfer of knowledge (Fig. 2.3; Fig. 2.4):

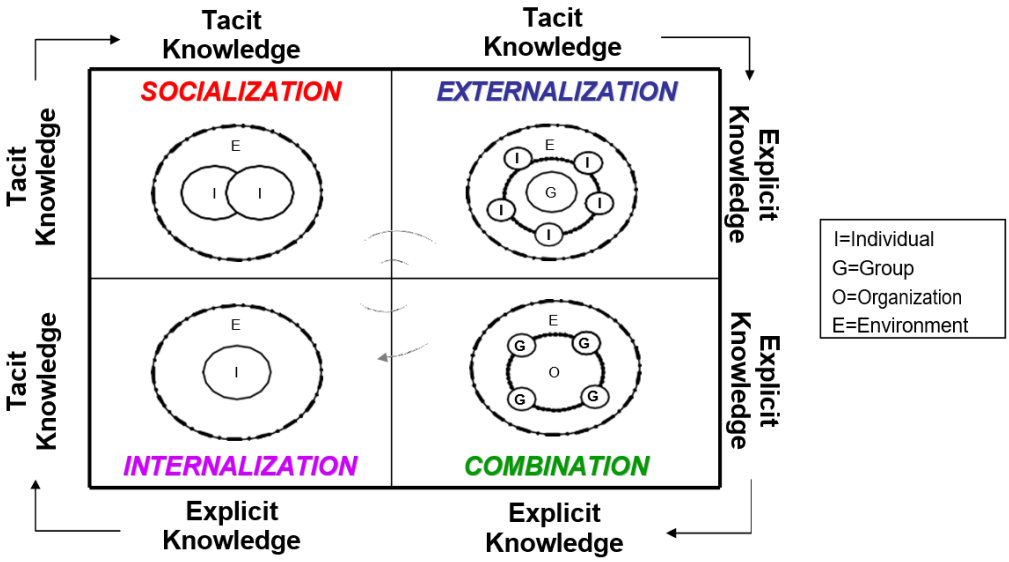
1. Socialization (from tacit to tacit): the dissemination of tacit knowledge, sharing experiences, feelings and emotions, through face-to-face relationships or informal channels;
2. Externalization (from tacit to explicit): the purely personal choice concerning the knowledge to be externalized and the consequent formalization;
3. Combination (from explicit to explicit): the generation of further explicit knowledge, through the combination of codified knowledge deriving from different protagonists;
4. Internalization (from explicit to tacit): the assimilation by the subject of explicit knowledge, which will be combined with tacit knowledge already possessed.

Fig. 2.3: The Spiral Model (SECI)



Source: Nonaka I., Takeuchi H. (1995), *The Knowledge Creating Company*, Oxford University Press.

Fig. 2.4: Nonaka & Takeuchi's Spiral Model

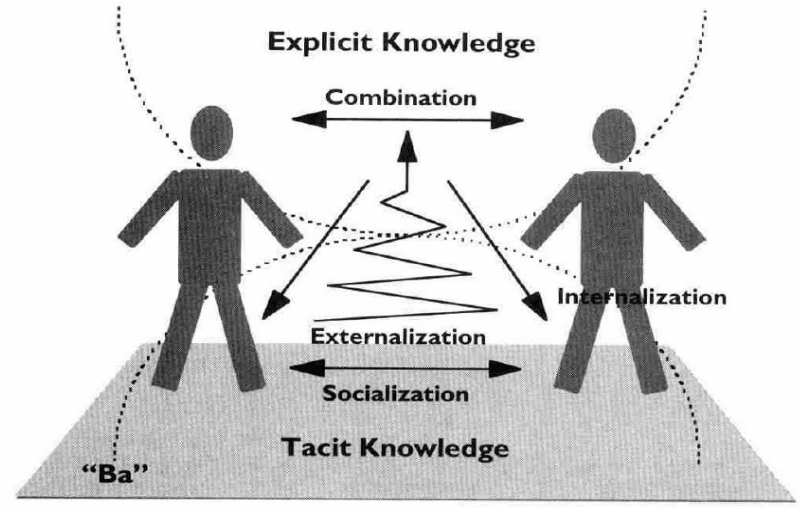


Source: Nonaka I., Takeuchi H., Katsuhiro U. (1996), "A theory of organizational knowledge creation", *International Journal of Technology Management*, vol. 11, n. 7/8.

Taking up Casey's statement "there is no creation without a place" (Casey, 1997), a fundamental requirement of functioning is a site that allows and facilitates the relationships between subjects, which leads to the generation, dissemination and exploitation of knowledge.

Thus, Nonaka introduces the concept of "Ba", a Japanese word for defining "place", to indicate the situation that sees different subjects cooperating for the production of knowledge (Nonaka, Corno and Renmoeller, 1999). When knowledge should be separated from the Ba, as mentioned above, it would become mere information.

Fig. 2.5: Place as "Ba" and knowledge conversion

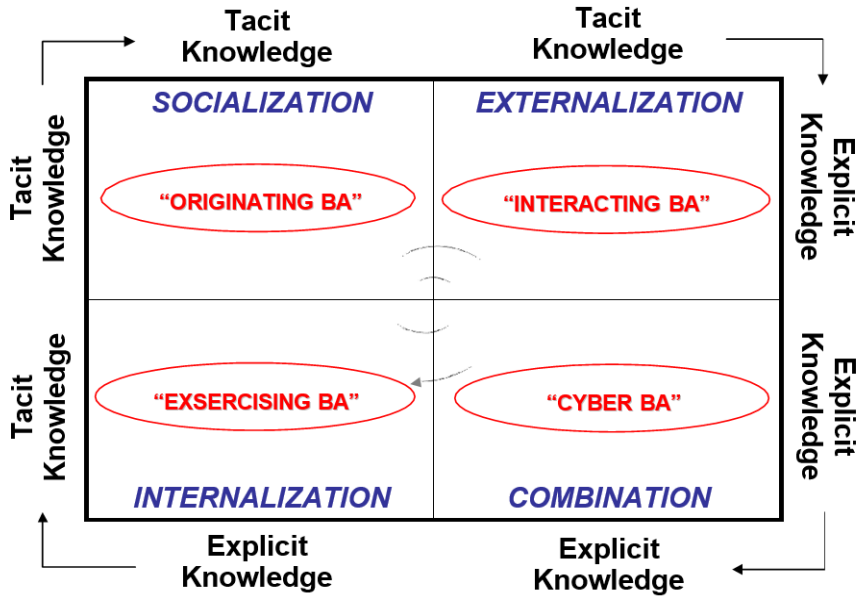


Source: Nonaka I., Konno N. (1998), "The Concept of "Ba": Building a Foundation for Knowledge Creation", *California Management Review*, vol. 40, n. 3, Sage Publications.

In any case, this space, which can be presented in physical (office), virtual (email, teleconferencing), mental (experiences, ideas) form, or as a combination of these, can be divided into four types, depending on the type of interaction and the tools used to support the different stages of the SECI mechanism (Fig. 2.6) (Nonaka and Konno, 1998):

- "Originating Ba": a place where interaction affects the individuals and the instruments are face-to-face. A site in which the socialization takes place, that is, the conversion and circulation of knowledge tacit to tacit; in which a sharing of mental models and experiences is feasible. This Ba is of effective realization when the obstacles to the circulation of knowledge are removed, in such a way that the subjects inside share the working and social environment, favoured by informal relationships and favouring the tacit knowledge sharing;
- "Interacting Ba": space characterized by collective interaction and face-to-face tools; in which tacit knowledge is transformed into codified knowledge, summarized in the externalization phase, and triggered by increasing connections and collaborations between individuals within groups or teams;
- "Cyber Ba": site where collective interaction and virtual instruments allow a combination of explicit knowledge with the pre-existing explicit one, giving access to multiple subjects in the classification, systematization and knowledge creation processes;
- "Exercizing Ba": place in which the phase of internalization takes place, understood as conversion of explicit knowledge into tacit, through individual interaction and virtual instruments. As in the context of the Cyber Ba, also in the Exercizing Ba information technologies assist the conversion of knowledge favouring learning.

Fig. 2.6: Types of "Ba" within the Spiral Model



Source: Nonaka I., Konno N. (1998), "The Concept of "Ba": Building a Foundation for Knowledge Creation", *California Management Review*, vol. 40, n. 3, Sage Publications.

2.2.1 The knowledge resource in clusters

As we have already said, the production of new knowledge is the driver of innovation. In clusters, the knowledge and its production represent the crucial apparatus of all entrepreneurial activities, with the aim of creating and updating resources that generate competitive advantage.

These clustered organizational models are born precisely to favour the creation of a network that allows the sharing and production of new knowledge. In fact, the internal network of the cluster network is necessary for sharing, since knowledge being informal and not codified spreads better at the local level; and for the production of further knowledge, as the science-based innovations, unlike the district ones, base their nature on specialized knowledge which requires conspicuous interventions and activities in R&D (Pavitt, 1984).

For this reason, while in the industrial districts the production of innovative knowledge is the result of knowledge transfer and absorption activities; on the contrary in clusters, present in science-based sectors, the innovative process is started by the creation of new knowledge, which is nothing but the combination of in-house (firm-specific) product knowledge and partner/network specific knowledge that is transferred and absorbed among the localized companies (Pavitt, 1984).

As just announced, according to Schiavone, the knowledge localized in a cluster, promoting innovation and value, can present itself as (Schiavone, 2008):

- Firm-specific: if it is held by the company and influenced by its resources, experience and internal R&D activity;
- Partner-specific: in the case that it is generated by the relationships that the clustered companies undertake among themselves, by the mutual sharing of knowledge in order to create new knowledge through recombination;
- Network-specific: in the case of internal cluster knowledge, made available only to internal local actors by public bodies, research institutes and universities.

The first term means the knowledge that distinguishes the company, thanks to which (in a Knowledge-Based view) it has a long-term advantage.

This type of knowledge is the manifestation of in-house activities, or the learning of the subjects inside the company. It follows that this knowledge depends on internal social factors, such as the cultural context, the level of education and work, and professional experiences. R&D activities and the production of new firm-specific knowledge are not an universal procedure, but they are altered based on the local context of the cluster.

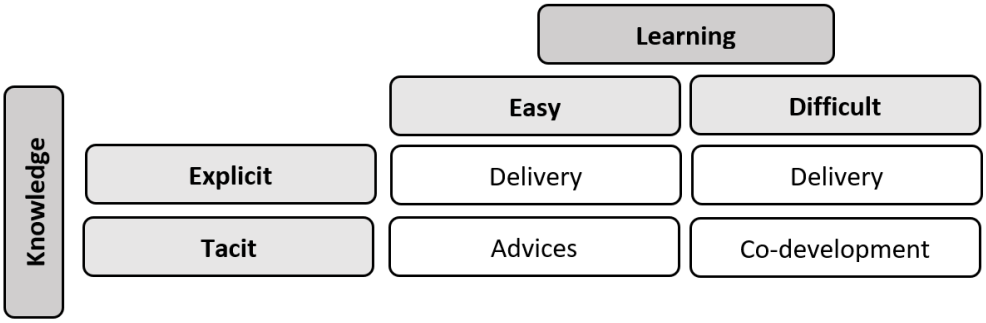
In any case, public and private institutional bodies, universities, and research institutes collaborate closely with the local reality in order to commercialize the basic knowledge held by the territory, also actively participating in the training and enhancement of professional figures.

The mechanism that will lead to the production and circulation of firm-specific knowledge is then divided, cyclically and similarly to the district areas, into four stages (Dayasindhu, 2001):

1. Socialization (from tacit to tacit): the dissemination of tacit knowledge, sharing experiences, through face-to-face relationships or informal channels such as imitative ones;
2. Externalization (from tacit to explicit): the purely personal choice concerning the knowledge to be outsourced and the consequent decoding;
3. Combination (from explicit to explicit): the generation of further explicit knowledge, integrating codified knowledge with basic knowledge;
4. Internalization (from explicit to tacit): assimilation by the subject of explicit knowledge with tacit knowledge already possessed.

Paying attention instead to the partner-specific knowledge, it could be possessed by an internal organization, as well as one positioned outside the confines of the cluster.
In the internal transfer of this type of knowledge, counterparties can be both public and private.
Analyzing the transfer methods based on the involvement of the actors (Fig. 2.7), we highlight the role of factors such as the complexity of learning (easy/difficult) and the nature of knowledge capable of influencing this process.
In situations of tacit knowledge, the concrete transfer is given by the co-development in difficult learning and by the advices in easier ones. On the contrary, in cases of explicit knowledge, the delivery is the most suitable automatism (Leonard-Barton, 1996).

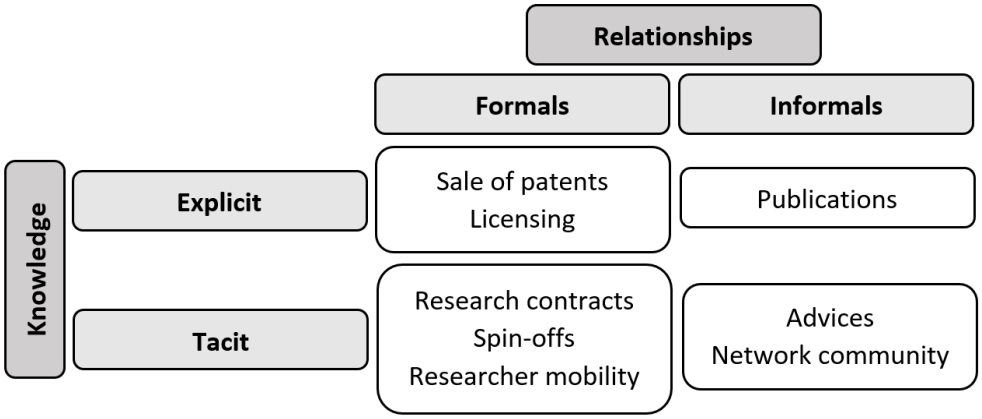
Fig. 2.7: Matrix of involvement of the actors in a partnership within the cluster



Source: Leonard-Barton D.A. (1996), *Wellsprings of knowledge. Building and sustaining the sources of innovation*, Harvard Business School Press.

Another analysis is related to the study of the methods in which knowledge is transferred from university institutions to companies (Fig. 2.8), depending on the formality and informality of the relationships and also in this case based on the nature of the knowledge (Baglieri, 2008). When dealing with a circulation of codified knowledge, it can be implemented through the use of formal channels such as licensing and/or patents, or informally through, for example, simple publications. If it is tacit knowledge, it is believed that spin-offs and researcher mobility are the most efficient formal approach, while advices define the informal channel.

Fig. 2.8: Knowledge transfer matrix between universities and companies belonging to a cluster



Source: Baglieri D. (2008), "Brevetti universitari e trasferimento tecnologico: alcune considerazioni critiche", *Sinergie*, in *Rivista di studi e ricerche*, vol. 75.

Finally, it is important to emphasize that this mode should not be the only source of knowledge. We must pay attention to the right balance and trade-off between the production of in-house knowledge and cooperation for the external acquisition and/or production.

Unlike the district realities, in order to transfer knowledge to the cluster-network, both intra-company and intra-organizational relationships are basically important, as well as those cooperative relations between companies, public institutions and universities, which vary depending on the cluster life cycle stage.

In the early days, institutional bodies favour social relations between organizations and territorial entrepreneurship, becoming a source of learning for localized actors (Schiavone, 2008).

In the stage of maturity and stability, on the other hand, they operate to allow the entry of network-specific knowledge. Unlike the two analyzed knowledge (firm-specific and partner-specific), this typology can be reached and used by the whole cluster, and therefore appears as a competitive driver only with respect to external companies.

2.2.2 Component knowledge and architectural knowledge

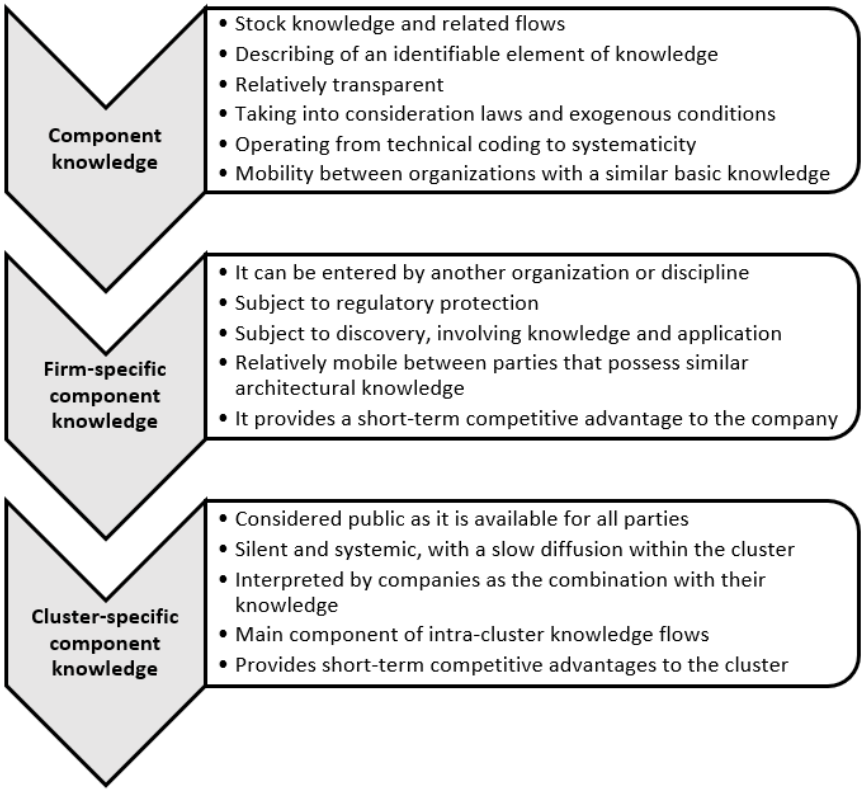
In the perspective of clustered areas, knowledge is increasingly assuming a multidimensional character, involving elements such as privatization, complexity, transparency, tangibility, independence and its systematicity. Furthermore, it is more appropriate to define these elements of knowledge as continuous contexts rather than split aspects (Matusik and Hill, 1998).

On the other hand, it is essential to remember that not only the nature of knowledge influences learning processes, but also the capacity of the recipient organization to absorb this knowledge.

The reasoning of Matusik and Hill is therefore important and useful, focused on the conformations of the knowledge related to the organization, in which they elaborate the classification between knowledge of the components and architectural knowledge, passing from a technical context (Henderson and Clark, 1990) to a company level (Matusik and Hill, 1998).

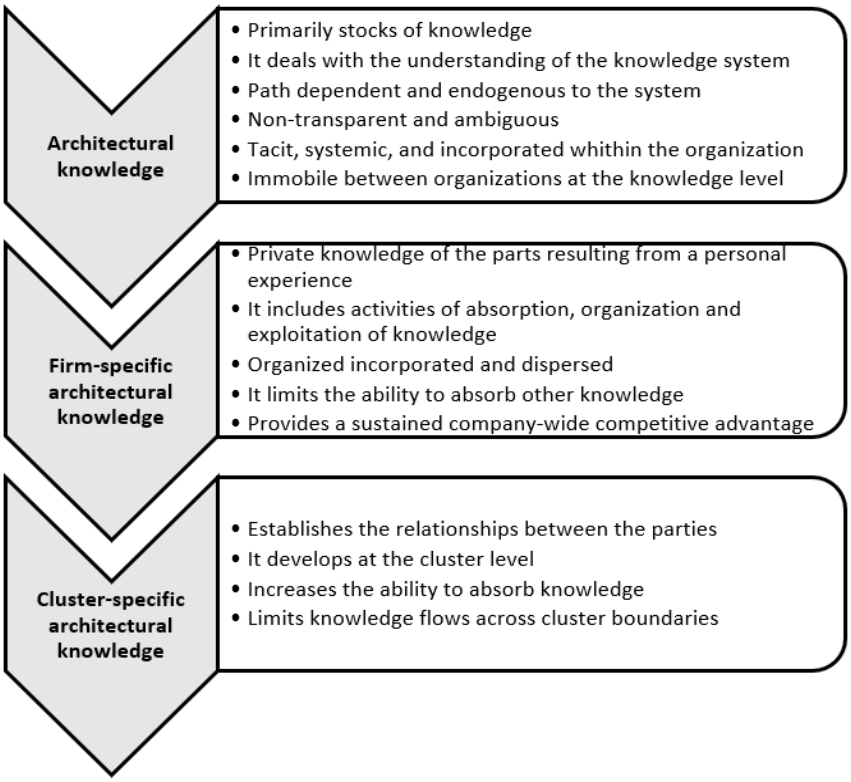
These terms (Fig. 2.9; Fig. 2.10) reproduce the factors ensuring continuity, rather than a mere independent distinction, even if they differ in their personal abilities of cognitive circulation between organizations. It follows that the notions of knowledge of the components and of architecture succeed in some way in offering further bases of competitive advantage in the companies. For this reason, more and more frequently we try to extend these concepts towards a perspective aimed at understanding clusters.

Fig. 2.9: Summary of types, characteristics and effects of component knowledge, at firm and cluster level



Source: Pinch S., Henry N., Jenkins M., Tallman S. (2003), "From 'industrial districts' to 'knowledge clusters': a model of knowledge dissemination and competitive advantage in industrial agglomerations", *Journal of Economic Geography*, vol. 3, n. 4, Oxford Academic.

Fig. 2.10: Summary of types, characteristics and effects of architectural knowledge, at firm and cluster level



Source: Pinch S., Henry N., Jenkins M., Tallman S. (2003), "From 'industrial districts' to 'knowledge clusters': a model of knowledge dissemination and competitive advantage in industrial agglomerations", *Journal of Economic Geography*, vol. 3, n. 4, Oxford Academic.

2.3 The transfer of knowledge

2.3.1 The knowledge transfer in district areas

As highlighted above, the long-term competitiveness of these companies agglomerations is also due to their innovative capacity.

In this current period of change, the concept of district is no longer attached only to the Marshallian vision of an agglomeration of small and medium enterprises, but it is also seen as a "cognitive lab" in which an efficient exchange of information and knowledge takes place between the district parts that exploit this geographical proximity (Belussi and Pilotti, 2002).

Subsequently, we proceed to study the cyclical process of innovation in the district and the interactions in order to update the knowledge absorption, production and diffusion model (Camuffo and Grandinetti, 2006).

Following this process, the knowledge of a subject is assimilated by a counterpart, giving rise to additional learning paths, through the coexistence of an information system and an interpretative one (Albino, Garavelli and Schiuma, 1998). The first concerns the transfer of knowledge from one actor to another, the second concerns the interpretation of the recipient about the knowledge received that occurs on a personal level.

Starting from the definition set out above, the following elements influencing effectiveness can be identified (Albino, Garavelli and Schiuma, 1998):

1. Subjects: who express a propensity to reciprocal sharing of knowledge between the counterparts, holding a similar previous experience.
2. Context: which may consist of internal behavioural and cultural characters, influenced by the ability to assimilate and disseminate knowledge; or he can consist in the external space of the relations between organizations, subordinated to the nature of the market, of the collaborations and of the alliances.
3. Content: which concerns the effectiveness and concreteness of a particular equivocal and uncertain task performed.
4. Media: understood as any means that allows the transfer of data and information formalizing the transferable knowledge, influencing and validating the mental patterns of the subjects concerned.

The following is an analysis of how this first stage described above materializes in the district reality.

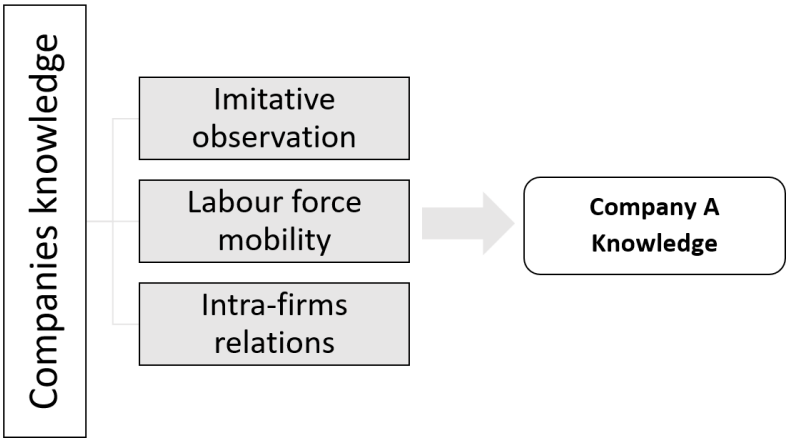
Within a district, the knowledge transfer can take place within the district, involving subjects inside the area, or outside the district, involving internal and external parts, and finally inside the organization.

2.3.1.1 Knowledge transfer between district companies

In the district context, knowledge propagates fundamentally through three processes that involve a decrease in information costs, without a concomitant increase in coordination costs (Fig. 2.11) (Camuffo and Grandinetti, 2006):

1. Direct imitative observation;
2. The labour force mobility created between the localized companies;
3. The intra-company relations in the district sphere.

Fig. 2.11: Mechanisms of knowledge transfer in district areas



Source: Camuffo A., Grandinetti R. (2006), "I distretti industriali come sistemi locali di innovazione", *Sinergie, Rivista di studi e ricerche*, vol. 69.

The process of imitative observation focuses on absorbing the greatest number of information incorporated and it is due to underdeveloped patent policies and a tolerance towards the dissemination of information, maintaining a fair balance between collaboration and competition (Camuffo and Grandinetti, 2006).

The second mechanism sees the workforce as a knowledge carrier, whose high degree of mobility is linked to social relations between different companies but internal to the same district, guaranteeing the knowledge transfer.

Finally, taking into consideration the relationships between district companies, we must distinguish those channels of a direct and indirect nature. The direct channels are purely used by companies included within the production chain, and for the remaining part by horizontal links. Indirect relationships, on the contrary, allow a rapid dissemination of knowledge in the districts, thanks to the network that supports the diffusion even among companies that do not relate directly.

Even the institutions, defined as "social architects", play a fundamental role in the district networks, favouring the local circulation of knowledge (Corno, Renmoeller and Nonaka, 1999).

In this way we agree with a modern definition of sharing knowledge, underlined by Breschi and Lissoni, in which the advantage in the diffusion and creation of tacit knowledge is also and above all given by social proximity and not only by geographical proximity (Breschi and Lissoni, 2001).

This new vision, in which the sharing of knowledge can manifest even between two companies within the district, gives consistency to the theory that the organizations

located within the district area possess a capability to create knowledge despite the lower degrees of investment in R&D compared to clustered companies.

These exchanges and the consequent gathering of knowledge within the local area create the contextual knowledge, that is the stock knowledge of the district, made up of already-absorbed explicit knowledge outside the area and the typical tacit knowledge of the district. It can be summed up as the sum of all those experiences of the local environment and it gives the parties the possibility to spread and receive knowledge (Belussi and Pilotti, 2002).

Considering the internal production of knowledge which then supplies the transfer channels previously analyzed, we examine the factors that, according to Bellandi, explain knowledge creation at the company level (Bellandi, 2003):

- The subdivision of professional figures and of labour related to knowledge between companies, taking advantage of the different district specializations at horizontal and vertical level;
- The idiosyncrasy of the creation of knowledge according to which entrepreneurial actors, despite having the same specialization, can develop different strategic solutions despite the same extent of the problem.

Finally, we must not forget that the growing specialization of the company has increased the difficulty of sharing knowledge. For this reason, we rely on another process of knowledge transfer, according to which information can be collected from outside the district borders in order to find additional resources.

2.3.1.2 Extra district knowledge transfer and focal firms

Before describing this mechanism of diffusion between companies within and beyond local boundaries, it is advisable to define focal and leading firms.

Leading firms are those companies that use the network outside the district in order to approach external knowledge, which will be shared and absorbed in the district. These leading firms differ from small firms, through a systematic advantage in the assimilation of knowledge coming from the outside, given by a firm-specific nature that allows to have a basic knowledge very close to the external one (Cohen and Levinthal, 1990). Thanks to their extensive network and in particular thanks to their organizational and coordination abilities, these entities are described by Lorenzoni and Baden-Fuller as the strategic

centers capable of directing the district area towards innovative development (Lorenzoni and Baden-Fuller, 1995).

Leading firms, besides being fundamental in the assimilation of knowledge outside the boundaries of the district, are also vital internally as they bring out new knowledge and new technologies, producing spin offs and attracting the attention of analysts and external investments.

The focal firms present the ability to import and locally diffuse external knowledge, by controlling the extra-district area in order to seek new knowledge, investing in internal research and development activities and thus having a vast previous knowledge (Malpiero, Munari and Sobrero, 2003).

The facts that companies within the boundaries do not present homogeneity and interchangeability, that a small number of companies have the ability to coordinate an extended and diversified network of relationships (Lorenzoni and Baden-Fuller, 1995), and that large companies typically transmit knowledge locally, show how the presence of focal firms in this type of knowledge transfer is crucial (Uzzi, 1997).

Taking up the authors Malpiero, Brunari and Sobrero, focal firms represent the driving force of innovation, holding resources and sources of knowledge (Malpiero, Munari and Sobrero, 2003). In addition, they represent the technological gatekeepers, since they are able to import external knowledge representing the source of knowledge transfer, and also to allow the improvement of the absorption of knowledge making it inflow through numerous relationships, including external ones (Allen, 1984; Mulgan, 2017).

Unlike small businesses, this type of organization excels in relationships, in organizational capacity, as well as in stock knowledge and in cognitive and innovative resources. As a result, SMEs are not able to assimilate this external knowledge far from the basic one, if it is not first assimilated and introduced into the network by focal firms (Malpiero, Munari and Sobrero, 2003).

Finally, even in the extra district model, institutions such as universities and public bodies perform a basic function, as they cut down research costs by codifying the knowledge and making it more accessible to small firms (Maskell, 2001).

2.3.1.3 Internal district organization knowledge transfer

As soon as knowledge is assimilated within the organization, it is communicated to all company dimensions.

To implement this mechanism, according to Gilbert and Cordey-Hayes, the organization must obtain information from external zones, and divulge them internally, protecting them. To make this automatism concrete, inside the area we must find a significant level of propensity to receive external information and knowledge, assimilating and integrating them with pre-existing competencies, abilities, activities and skills (Gilbert and Cordey-Hayes, 1996).

Having described how the knowledge transfer is articulated in the districts, we then examine the capacity of knowledge absorption.

2.3.2 Absorptive capacity

The first definition was introduced by Cohen and Levithal, meaning the subjective ability to identify, valorise, unite and exploit the knowledge of the counterparts (Cohen and Levinthal, 1990), and it was subsequently expanded even integrating the commercial purpose of the recipient actor.

In 1994 the definitive formulation was reached by Langa, Llewellyn, Lang, Weir, Wallace, Kabeto and Huppert, as “an ability that encompasses the mere exploitation of knowledge and also the capability to foresee and anticipate those future innovative and technological developments” (Langa, Llewellyn, Lang, Weir, Wallace, Kabeto and Huppert, 2009).

In this way the authors underline that investments in this ability contribute to a concrete use of knowledge, as well as to a temporal advantage, foreseeing imminent innovative challenges.

Absorptive capacity depends on the cognitive elements of the local context, which is the stock knowledge, positively related to the cognitive proximity of the interested parties.

In addition, another driver that favours the absorption of knowledge is the cognitive interaction, that is the subjects' ability to relate.

Focusing on the cognitive proximity, it is favoured by the characteristics of the organization. When groups within the population of district firms are composed of homogeneous companies at the level of output produced, the probability of success of

intra-company knowledge transfer is maximized by sharing the same production line and reducing the cognitive distance. On the other hand, this closeness is inferior and weaker when companies present inhomogeneous production.

Here comes into play the cognitive interaction that still allows to proficiently exploit interpersonal relationships, even when there is a lack of cognitive proximity.

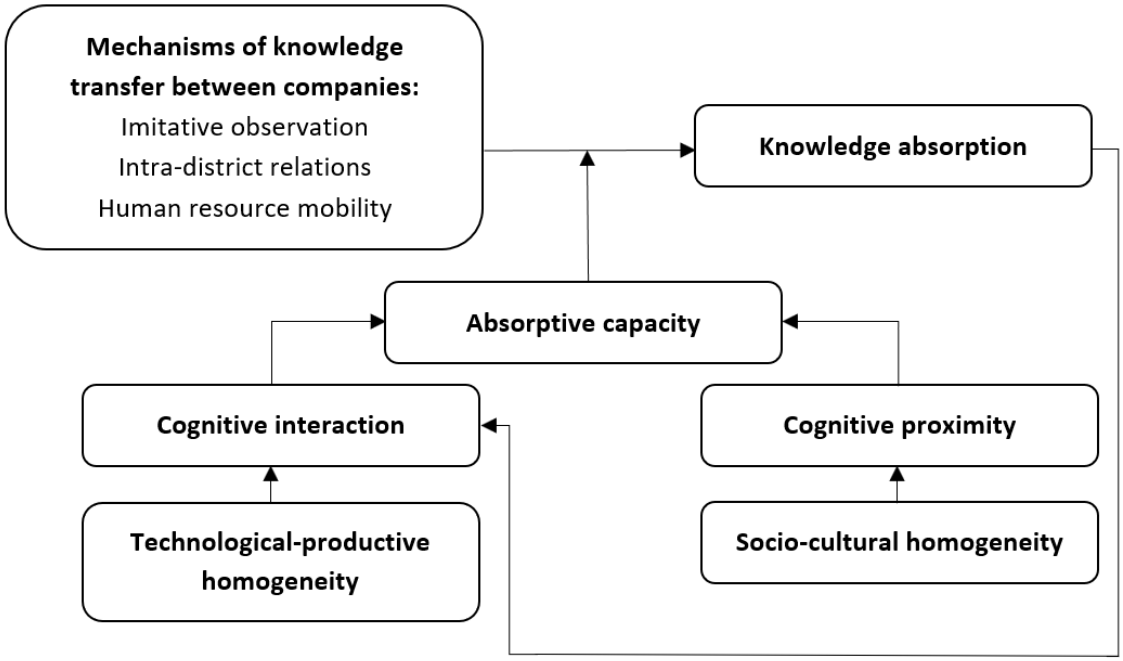
This cognitive interaction is facilitated by the nature of the local community, which with Marshallian and Becattini's theories is identified as a specific intangible resource of the district. In fact, the district is defined by Becattini, a socio-economic entity "characterized by a community of people and a population of companies that coexist and live within the same territory, and for this reason they cross paths, creating an overlap between social and community life and production activities".

The community in this context is open due to the influxes and outflows of goods and people caused by the nature of the district and problems of growing returns. The entrepreneurial population, on the other hand, is segmented at different stages of production as each company holds a certain level of specialization in certain phases of the production process. (Becattini, 2004).

Summarizing and contextualizing these two drivers, we can claim that there is a wide ability to absorb knowledge within district firms.

The circulation of these knowledge, influenced by the district characteristics, offers transparency and openness to the local area from the information point of view. In this way the Marshallian "industrial atmosphere" is created, a context in which, thanks to the two cognitive properties, there is a simplification and a support in the absorption of knowledge (Fig. 2.12).

Fig. 2.12: The transfer of knowledge between district companies

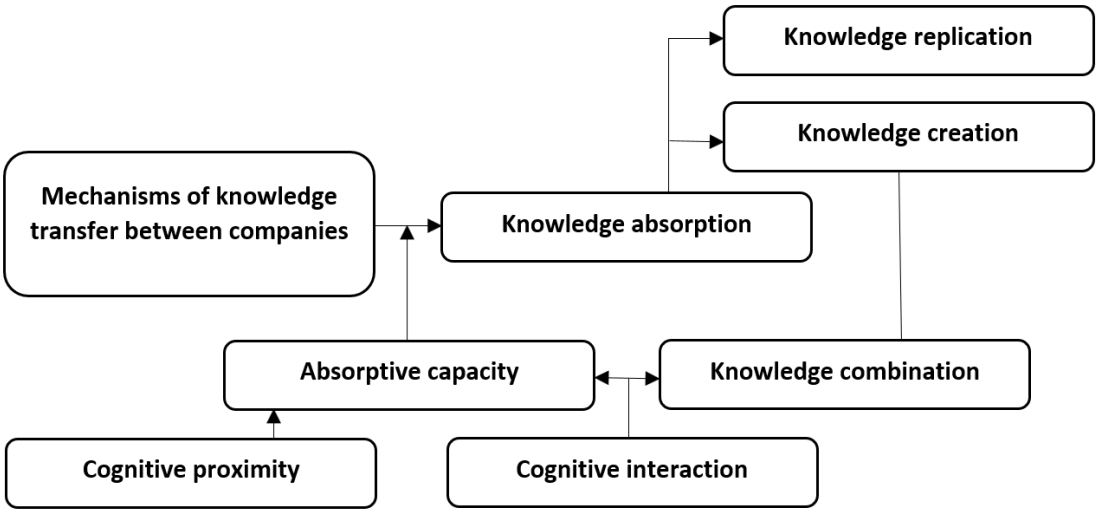


Source: Camuffo A., Grandinetti R. (2006), "I distretti industriali come sistemi locali di innovazione", *Sinergie, Rivista di studi e ricerche*, vol. 69.

By integrating knowledge transfer processes into the scheme, attention is paid to the importance of the task covered by cognitive interaction when the combination process occurs through relationships. It makes possible to facilitate the knowledge spreading and production while at the same time offering support to the combinatorial phases.

This interaction, therefore, not only favours the flow of knowledge, but also supports its integration into the creative processes of new knowledge (Fig. 2.13) (Camuffo and Grandinetti, 2006).

Fig. 2.13: The transfer and the related combination of knowledge between district firms



Source: Camuffo A., Grandinetti R. (2006), "I distretti industriali come sistemi locali di innovazione", *Sinergie, Rivista di studi e ricerche*, vol. 69.

After observing the determinants of absorptive capacity in the districts, it is advisable to study the phases of identification, assimilation and exploitation (Cohen and Levinthal, 1990).

The first appellation refers to the identification of knowledge and its acquisition. This ability is influenced both by previous knowledge (Cohen and Levinthal, 1990) and new scientific discoveries. In this first phase, focal firms perform a very important task, simultaneously holding a broader prior knowledge and a competitive scanning capacity (Langa, Llewellyn, Lang, Weir, Wallace, Kabeto and Huppert, 2009).

The second phase is related to the assimilation, referring to the routines of analysis and cognition of knowledge coming from external sources. The focal point of this phase is the distance between the previous knowledge and that coming from outside that makes assimilation difficult as this becomes greater (Szulanski, 1996).

At district level, however, according to Becattini, companies are facilitated by sharing the same contextual knowledge (Becattini, 2004).

With the third term, exploitation, we turn to the simple application of assimilated knowledge. Furthermore, we know how to create organizational processes that favour company expansion, perfecting or reiterating activities, or creating new ones in a way that assimilates the transferred knowledge.

In this context, Bellandi notes that, at the district level, companies prefer to start innovative processes by acquiring knowledge deriving from the experiences of others, rather than from internal R&D activities (Bellandi, 1996).

2.3.3 Knowledge transfer in clusters

The studies conducted by Guo and relating to the transfer of knowledge in clusters demonstrate how coexistence of channels is possible, such as interpersonal relationships, mobility of professional figures, supply relationships, imitative processes, and relations with training, research and organizational bodies (Guo B. and Guo J.J., 2010). This coexistence allows the creation, enhancement and dynamism of competences, which are very important in environments where continuous supply of innovations within the market is required.

Several researchers support Polanyi's work, in a knowledge-based perspective, stating that transfer is influenced by the degree of knowledge encoding (Haas and Hansen, 2003; Jensen and Szulanski, 2007; Paswan and Wittmann, 2009).

In the case we have to deal with explicit knowledge, the interested parties benefit from formal exchanges that pay little attention to Information Richness (IR). On the contrary, mechanisms with an high level of IR are necessary when one is interested in tacit knowledge and therefore difficult to codify (Teece, 1986). In any case, given the complementary nature of the explicit and tacit knowledge, an high use of IR is always advisable.

Through empirical studies on different clusters, three circumstances are theorized in which a transfer of knowledge takes place in the clustered area.

In the first situation, where knowledge is characterized by an high level of coding and expressed in manuals, reports and databases, it can circulate through a low level of IR such as emails, forums, chats, faxes, etc..

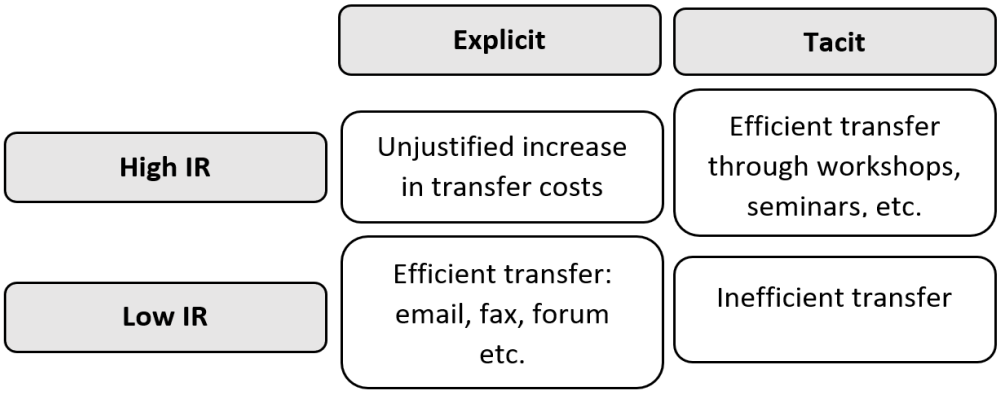
In the second condition, where most of the partner-specific knowledge is tacit and hardly assimilable, it is necessary to use mechanisms with an high IR that allow an effective interaction between the counterparts (Sreckovic and Windsperger, 2011).

In the case that these circumstances are not fully met, two different types of problems arise.

The first inefficiency concerns a scarce use of IR even though the knowledge is mostly difficult to exchange, with the consequent inability of the counterpart to take advantage of this knowledge.

The second type of inefficiency concerns the unjustified increase in transfer costs, due to the use of mechanisms with an high level of IR in order to disseminate codified knowledge (Fig. 2.14).

Fig. 2.14: The transfer of knowledge based on the characteristics of knowledge and the Information Richness level



Source: Sreckovic M., Windsperger J. (2011), *Organization of Knowledge Transfer in Clusters: a knowledge-based view*, Contributions to Management Science.

Finally, the third condition is characterized by the combined presence of explicit and tacit knowledge, in which it is advisable to use mechanisms that employ an high degree of IR, guaranteeing a flow of partner-specific knowledge (Sreckovic and Windsperger, 2011).

To sum up, regardless of whether it is labour or capital intensive knowledge, proximity and cognitive interaction represent the factors that allow absorptive capacity in districts and clusters. The only difference is that in the clustered environment, even the resources of internal research and development processes are among the positive factors of assimilation, due to the articulated and heterogeneous nature of the knowledge in question.

Chapter III
Districts and Clusters as Local System of Innovation and Knowledge Integrators Network

As we have seen, the survival of the forms of industrial aggregations is still closely related to the production of innovations and new knowledge.

In this chapter we will take up again the economic notions related to the order of the cognitive networks of Hidalgo however assuming an humanistic point of view. We will therefore concentrate on the factors that allow a community economic development despite the individual limited capacity for accumulating knowledge. In doing so, Steven Sloman e Philip Fernbach will focus attention on the illusory knowledge of individuals, as they generally think they know more than they actually know. Furthermore, alongside the theories of Hidalgo, the studies will focus on the creation and maintenance of networks that allow to assimilate individual abilities guaranteeing a collective development through a division of cognitive work.

Since it is therefore impossible to innovate without new knowledge learning, the attention of the districts lies in the search for new sources of knowledge and in the implementation of a learning-prone society.

The birth of these learning societies, which arose around the beginning of the nineteenth century in the most advanced countries, brought improvements in the skills and competences of companies and workforce in the most diverse fields, from industrial production to entrepreneurial management, from supplying to distribution, thus optimizing the value chain and the production chain of the local area.

According to the reference literature of Joseph E. Stiglitz and Bruce C. Greenwald, reducing the knowledge gap between the various companies and improving production efficiency, also thanks to the constant support of institutions, centers, organizations and policies, this society closely linked to learning implements further specializations and innovations introduced by new knowledge. In this way the district or area represented by these companies pursues the aim of promptly and flexibly responding to the continuous changes in global markets, maintaining a vocation to the circulation of knowledge through the sharing of external economies (Stiglitz and Greenwald, 2014).

At this point, through these changes, the districts take on the role of local innovation systems. This definition is linked to the innovative and progress functions that local

leading companies are capable of effectively facing the global market and of creating a network of intra and extra-district relations that allows a continuous transfer of innovations, technologies and knowledge (Breschi and Lissoni, 2001).

The delocalization processes therefore concern only the companies, usually large ones, capable of creating direct channels in the different target markets. In this way the local entities not equipped with the skills necessary to internationalize will be able to maintain a certain distance from the strong international competition, but thanks to the networks created they will be able to draw on the resources, skills, knowledge and external innovations assimilated by the leading companies (Bartlett and Ghoshal, 1989; Grandinetti and Bortoluzzi, 2004).

Local innovation systems, like learning societies, must receive constant support and assistance from institutions, R&D-focused and training centers, in order to persist in the management of a territorially delimited environment but still open to cooperative and collaborative exchanges from an open-innovation perspective (Bellandi, 2003).

At this juncture we are going to examine the processes of opening up local systems, the external knowledge acquisition and the formation of district-global companies that, projecting their value chain and their production chain towards internationalization, allow access to the specialized knowledge produced outside local borders.

Finally, starting from this need to openly relate with the external ecosystem and applying the studies implemented by the professors Giulio Buciuni and Gary Pisano, we will deepen the theme and functions of knowledge integrators and network knowledge integrators, which represent the promoters that allow and support the processes of knowledge creation and circulation in local areas, ensuring their innovative development (Buciuni and Pisano, 2018).

3.1 Illusory knowledge and the birth of the knowledge community

Resuming the economic and cognitive notions introduced by Hidalgo, the capacitive limits of individual subjects (personbyte) were assumed in a more humanistic and less economic key by the authors Sloman and Fernbach in the attempt to understand economic development despite the low level of individual knowledge.

According to the two scientists and professors, being screened within a community or a supply chain of knowledge allows us to survive as individuals despite we lack important and necessary knowledge and skills. It is precisely the capacity and ability to relate to and

create collaborative cognitive ties that guarantee complex economic and social development and above all constant and increasing access to knowledge and know-how (Whiten and Erdal, 2012; Sloman and Fernbach, 2017).
The authors define this ability to relate and share skills and fragmented knowledge in the minds of different individuals as the division of cognitive work. This access to knowledge consequently creates an illusion in the minds of individuals, producing a sort of progressive underestimation of the importance of networks and the transfer of knowledge, as the subjects begin to develop the belief that they know more than they actually know.

Human thought is increasingly considered as a causal analytic process that determines our inferences. This purely intuitive and experience-based reasoning can allow us to integrate missing parts of which we have no knowledge through what we have learned, although not always the integrated interpretation leads to truthful deductions. In other words, in support of Hidalgo's theory, the ability to create knowledge does not reside in individual persons and in his individual reasoning, but surrounds them (Camerer, Loewenstein and Weber, 1989).
The cognitive capacity of economies stagnates in coordinating a group of subjects with a value greater than the simple sum of individuals, and capable of producing new information, knowledge and consequently intelligence. The fragments of compatible cognitive labour present in the various individuals are thus effectively integrated with one another within a knowledge community, through interdependent collaborations between subjects who share the same intentions and the same goals (Clark, 2004). The creation of a knowledge community therefore allows the maximization of the ability of individuals to accumulate and transfer new knowledge.
Nowadays, knowledge has reached highly qualified levels of specialization so as to require extensive and complex networks and forms of aggregation in order to achieve economic and social progress that allows for particular access and transfer of knowledge.

These levels have been achieved mainly by advancements in the field of technology, which changes have influenced the cultural, genetic, economic and relational aspects of societies (Sloman and Fernbach, 2017).
As claimed by Mulgan, technology has favoured the constant access and circulation of knowledge, in a certain sense linking the human being to the concept of machine, combining the two factors and giving both of them greater importance. In this way the

technology will be able to let more information flow between the collaboration networks, connecting and increasing the capabilities of individuals (Mulgan, 2017).
If on the one hand technological advances have improved living conditions, on the other hand they have increased competition and therefore also distrust of sudden changes in economic progress.
Another obstacle in the cognitive efficiency of the knowledge community is the presence of irrationality in assessments, conditioned by social and cultural beliefs distributed in the territory capable of exercising a greater influence than education. These beliefs and convictions, extremely difficult to modify, do not give a real perception of how much the individuals actually know and learn, and the attempts of training and education become useless if they are not reflected in the social and community consensus. According to the author, the first step to change these beliefs would be to admit the existence of the illusion of knowledge, as we think we know more than we really know, so as to accept the need to relate in order to survive and develop (Sloman and Fernbach, 2017).

Starting from this point, we begin to interpret intelligence as an individual's ability to contribute to the community of knowledge that surrounds him. It is no longer considered as the ability to reason and solve problems autonomously, but rather as the ability to participate in the cognitive and innovative success of the group to which him belongs, relating and balancing different but compatible competences belonging to different individuals (Bonabeau, 2008).
Education and training thus take on a new mold, starting from the acceptance of not knowing, to understanding their cognitive abilities and their role within the knowledge community. The attempt is to develop and deepen a scientific education that disregards beliefs, not offering more information but rather integrating a training in prompt delivery that implement decision-making rules and reduce cognitive complexity (Sloman and Fernbach, 2017).
In a certain sense, however, the illusion creates the courage and the (illusory) security required to create new relationships and produce new knowledge. This security is also guaranteed by leading figures within the groups, which will be analyzed in more detail later, able to guide the entire community towards cognitive collaboration and learning as the basis of economic development and competitive advantage. In this way, the knowledge community becomes a kind of learning society.

3.2 Learning society as source of innovation

Nowadays, a new institution is emerging among economic policies, named as learning society, capable of making productive improvements and living standards. The learning, according to Solow, is a very important resource in order to achieve significant improvements in the fields of productivity, innovation and technology.

By learning we mean the set of productive capacities, the learning of how we learn, and the consequent reduction of the knowledge gap between the leading companies and the other ones (Fortis, 2006). In this learning revolution, the government is extremely important in order to promote innovation, the industrial manufacturing sector, welfare and above all knowledge and learning.

The birth of these "learning societies", which brought about improvements in allocative and accumulation capacities, in living standards, in the knowledge gap and in production efficiency, occurred during the 1800s in the developed countries of the West, and only recently in the countries Asian (Gereffi, Humphrey and Sturgeon, 2005; Sloman and Fernbach, 2017).

According to J.E. Stiglitz and B.C. Greenwald, the new learning abilities and the consequent spillovers give rise to an open economy, providing industrial policies and a network of infrastructures that develop growth and innovations, producing further additional learning spillovers between industries and between sectors (Stiglitz and Greenwald, 2014).

In this delicate context, economic policies and the government must manage the productive failures of the market, the allocation of resources in R&D and the closing of the gap. They are also responsible for the circulation of knowledge and for the improvement of learning, producing innovative spillovers and redefining policies, strategies, processes, and concepts such as the competitive advantage (Asheim and Gertler, 2005).

The importance of learning lies in the evolution and improvement of best practices, capable of increasing production, such as the creation of knowledge and innovations.

For advanced countries, the creation of a learning society consists of improving production, best practices, resource allocation, research and development investments and reducing the gap between average and best practices. For developing countries, we focus more on this last factor, so as to reduce the gap with developed countries.

The learning economy presents numerous differences with the neoclassical approach concerning the strategies, what needs to be learned and with which processes, which capabilities to improve and which contacts and catalysts exploit to create society.
In the innovative context we focus on learning new consumer needs, in order to create new products and new services. Furthermore, it is crucial to learn about their own comparative advantage (Spender, 1996; Stiglitz and Greenwald, 2014), about organization management and learning capabilities. The things to be learned also include learning to learn and learning for development, paying attention to economic activities that promote knowledge, adaptation and management to development risks.

In this perspective new learning processes are born, such as the learning of a better production deriving from mere production (learning by doing); the learning from previous learning opportunities (learning to learn by learning); the learning of tacit knowledge deriving from relations with other subjects (learning from others); the learning from commercial exchanges (learning by trade) and the learning resulting from technological and innovative changes (Teece, 1986).
In order to improve learning skills, we focus on the factors of education and access to knowledge.
The first one deals with making resources available that allow it to adapt to continuous market changes, evolving human capital and their basic knowledge. The second one focuses on the open source movement in order to make the largest possible number of knowledge channels available to society (Teece, Pisano and Shuen, 1997).
Learning, development and the transmission of knowledge are constantly influenced also by catalysts, such as the current technological advances conditioning the environment, and by contacts. The latter are capable of creating an interactive territory, skilled of developing agglomeration economies, and in some learning clusters they are assisted by a particular interactive location and geographical proximity.

3.2.1 Establishing learning companies

Among the main problems in the formation of a learning economy there is the management of institutions and organizations within which enormous exchanges of knowledge and learning are carried out.

Although it is desirable for the development of a society to effectively and efficiently spread the knowledge throughout the local area, local businesses focus on maximizing internal knowledge and information, possibly hindering and delaying the flow of such knowledge outside (Sloman and Fernbach, 2017).

The systemic problems encountered in this context find efficient solutions within innovative companies, offering possible incentives, organizational designs and structures. These companies, geographically delimited, take on large dimensions, being able to guarantee better production levels, huge investments in R&D and discrete financial resources to be allocated to innovative processes (Krogh and Roos, 1996).

Moreover, they enjoy a particular stable and continuous organization (particularly in the industrial sector), which also affects jobs and workforce, capable of guaranteeing, accumulating and maintaining a certain amount of knowledge and information.

An instability, micro or macroeconomic one, would affect the solidity of institutions that are vital for learning within the local area, leading to risk-averse actions, a reduction in research and development investments, a more difficult and expensive access to capital and a production slowdown.

In this typology of companies, in addition to the accumulation of knowledge, we focus more on human capital, able to offer a more effective production and adaptation by taking correlated activities (Stiglitz and Greenwald, 2014).

These geographically located corporate dimensions are extremely focused on the circulation of knowledge and learning, since a useful discovery for one company can be assimilated and combined by another. Therefore, the competencies in managing research and development, public incentives in consolidating a financial sector and investments in the collection of human capital become vital.

The geographical concentration, that represents another characteristic of these large and stable innovative companies, is no longer capable of supporting innovation and in particular learning, threatened by geographical proximity, cultural and social boundaries, relationships and the weak movement of human capital at international level. For this reason, these companies must encourage and commit themselves in order to reach extra-district and especially cross-national knowledge and information flows (Nooteboom, 2000).

3.2.2 Macroeconomic policies for learning societies

As previously explained, markets and more precisely geographical areas such as districts and clusters are not able to independently create a learning society.

The industrial and commercial policies must shape the structural organization of the economy and the sector, thus affecting the government, with the main objective of creating precisely this learning environment capable of promoting spillovers within it and healing the gap of knowledge (Nicolais and Festinese, 2009). These policies are further supported by financial ones to sustain the learning and the creation of a learning economy, environment and society (Sloman and Fernbach, 2017). These financial sector policies must focus on opening markets to foreign financial institutions, liberalizing financial markets and the circulation in the capital market, in order to support the evolution of learning sectors and learning externalities, facilitating cognitive and innovative exchanges between nations.

The government has the responsibility to guarantee macroeconomic stability and investments to support learning, with the aim of raising the levels of knowledge flows. By doing so, macroeconomic policies will focus on education, increasing creativity and learning, through complementary education and on-the-job training systems. In addition, the investment policies offer a more detailed, stable, articulated, legal and economic framework, aimed at ensuring a decent system of innovation and social protection.

Intellectual property rights are among the various instruments capable of stimulating innovation. Although they allow for better returns, they inhibit learning and threaten the circulation and assimilation of knowledge due to the secrecy that is guaranteed (Nooteboom, 2000).

Currently, therefore, we are interested in how to create an innovative system, emphasized on open source and open innovation, able to cope with structural and systematic problems of patents. The nature of this reality, where politics and society are closely connected, requires not only governmental interventions of different policies, but also and above all a desirable social transformation and a mentality that directs us towards new changes and new learning (Stiglitz and Greenwald, 2014).

We therefore try to create an open, inclusive and democratic economy, not only addressed by policies, but also by corporate decisions and by society itself. Educational, industrial, commercial and financial policies are accompanied by reshaping the social mentality, more predisposed to risk and learning, promoting economic openness and mental externalities with medium-long term effects (Lazerson and Lorenzoni, 2008).

3.3 Districts and cluster as local system of innovation

Introducing district forms of aggregation from the point of view of local innovation systems, we need to enter a knowledge-based perspective, which sees the creation of companies through spin-offs as a particular process of knowledge transfer.

The circulation of knowledge from an incubator to a new company represents a particular mobility of human resources, a certain phase of imitative observation and relational processes through internal and external channels (Rivkin, 2001).

The spin-offs born from imitative observations, therefore called replicatives, can consist of replications of the entire value chain or of a particular phase, giving rise to specialized companies detached from the realities with an integrated cycle. These spin-offs and their circulation arise from very simple corporate structures in the cognitive aspect, favouring precisely the birth of companies.

They are conditioned by human resources capable of combining new knowledge and learning relationships that are created internally and externally to the company and the district (Codara and Morato, 2002).

The presence of relational and cognitive channels (cognitive interaction) and the homogeneous community dimension favour the ability to absorb knowledge and therefore spin-offs (Bartlett and Ghoshal, 1989).

Lately, these channels are cognitively opening up towards the external environment, involving numerous sources such as human and/or business resources external to the district, non-district suppliers and key customers in the supply chain composition, actors detached from the district who import knowledge, as well as training and development institutions and centers.

The district's innovative and evolutionary processes, made possible by the integration of these sources, are mostly initiated by imitative observations of the main companies, equipped with technological, productive and technical competencies that allow them to manage and maintain productive progress, and in particular to spread knowledge within the district area (Corò, Gurisatti and Rossi, 1998).

The integration between innovative, incremental, radical and imitative processes have allowed the diffusion of learning at the district level. This spread of learning and external cognitive permeability has been strengthened in recent years by the presence of investment of large groups outside the district (Grandinetti and Bortoluzzi, 2004), attracted by strategic assets, competencies, knowledge and vital relationships for a competitive advantage.

These groups, acquiring or creating businesses, internalize themselves in the district, creating an important productive and cognitive bridge between the local and external environment, giving life to a new channel of knowledge transfer.

3.3.1 Local system of innovation facing global competition

In the international context, the district and clustered realities are seen as a laboratory, composed of economic, social and cultural elements, capable of innovating and developing, favouring investments in innovation, human resources, specialized workforce and consequently economic competitiveness (Maskell, 2001; Breschi and Malerba, 2005).

It is consequently important, in recent years, to encourage investments by companies, organizations and institutions, including foreign ones, on local innovative development projects, trying to project districts and clusters in a global and international perspective, acting as local innovation systems.

These forms of local agglomeration present a discreet level specialization flexibility that allows to effectively respond to the continuous market changes, and a technically fragmented and socially coordinated production cycle, directed to the sharing of external economies and to the incremental transfer of knowledge (Camuffo, 2003). The expansion of these supply chain economies was also triggered by cost reductions, productive outsourcing mechanisms and above all by an international opening that did not exclude the internal local realities but involved them in the innovation processes (Teece, Pisano and Shuen, 1997). Improvements in competitiveness, research, knowledge, learning, innovation and flexibility have been guaranteed in particular by the labour market and by the increase in social and entrepreneurial mobilization, offering adaptive capacities and a network of socio-economic relationships.

Another constant dynamic factor for the district is the territory, understood as a place of accumulation, creation and circulation of transferable knowledge and information (Cowan, David and Foray, 2000). This cognitive spiral is allowed and helped by territorial proximity, by the presence of institutions, centers, entrepreneurial laboratories and by the contact with positive externalities interconnected within the territory itself (Fortis, 2006).

The context of the Made in Italy leading companies shows a medium turnover, a limited staff and a modest membership in business groups. In any case, there is an opening up to

foreign markets, with a consequent increase in exports and turnover deriving from them, trying to reach a leadership position with respect to competitors (Cohen and Levinthal, 1990).

The projection that involves foreign channels, especially informal ones, does not consist only in the activities of mere sales of the products, but in a real strategic preside of the end markets, through relational networks, distribution channels, branches and delocalization processes (Bellandi, 2003). The international opening is thus supported through networks with strategic suppliers, supply channels, local tertiary activities and mainly through direct investments abroad (Amin and Robins, 1990).

In this perspective, the districts and clusters are no longer a circumscribed and delimited place, but they take on the role of local-international hub, where the inside realities try to integrate and combine a productive internationalization with foreign direct controls.

The leading Italian companies within the districts mostly maintain local supply relationships and an international presence solely dedicated to exports. In any case, these traditional companies are giving way to a more structured commercial projection, even if open-network companies capable of creating an union between a global supply and a structured international presence are still rare.

To continue this plan, companies must implement changes from a commercial, organizational, management, innovative and cognitive point of view, trying to effectively combine district factors and policies. In fact, in recent years specializations and investments in proprietary brands, in process, in product innovations and in specific R&D resources have emerged.

In this way and through these changes, the districts play the role of local innovation systems, relying mainly on three pillars.

The first one consists in the innovative and development function of leading companies, capable of evolving, expanding and progressing aspects such as management, organization, specialization, technology, productive and cognitive distribution of the district (Amin, 1993). Relationships are created between all district or cluster companies, creating a network aimed at innovation, technology and knowledge transfer, achieving competitive advantages and positions at an international level (Lazonick, 2005; Mulgan, 2017).

The second point is represented by delocalization processes of the production cycle, also favouring the local reality not exposing it to international competition but equipping it

with competencies, resources, capital, knowledge and innovations internalized from the external and foreign environment (Spender, 1996; Maskell, 2001).

Finally, as always, the role of institutions, research centers, laboratories and universities, is fundamental in creating a collaborative and cooperative environment capable of guaranteeing a certain evolutive level and growth.

The districts, understood as local systems of innovation, promote an economic and competitive growth, an innovative, productive and procedural development, assuming new and efficient resources, financial and human capital, headed by new innovative policies based on the balance between cooperation and autonomy (Rullani, 2003). Thus, a strategic and developmental sharing is born, aimed at creating alliances between different actors with the same purpose of local innovation, also guarantor of competitive advancement at national level (Spender, 1996).

3.3.2 District-global firms

With the ultimate aim of surviving the incremental phenomena of globalization, district-global companies, that are large companies (usually reached through the incorporation of other district companies, possibly with an international perspective) play a fundamental role within the district, creating networks of vast and articulated knowledge relationships on an international basis. This relates to the delocalization through direct or indirect channels of some production processes of the supply chain, the monitoring distribution channels in strategic foreign target markets, the relationships with external suppliers and industrial partners able to introduce competitive innovations and strategies at a global level (Beccatini and Rullani, 1993).

These complex innovations bring adjustments about product, process, organizational, management and relational changes, as well as requiring specific technological, informative competencies and absorptive capabilities of complex tacit knowledge and its codification and combination (Chiarvesio, Di Maria and Micelli, 2006). It follows that these innovative processes are difficult to be absorbed and implemented by small-medium sized businesses.

In this context, the district, in order to survive, must become a local system of innovation, capable of supporting innovative and international processes for all companies within the local district area (Brunetti and Camuffo, 2000). The evolutionary support for the weaker

district realities is thus guaranteed by institutions, policy makers, public or private bodies, which cover the role of knowledge-intensive business services, connecting, transferring, integrating and combining knowledge between the district and the external competitive dimension (Maskell, 2001; Rullani, 2003).

In doing so, these knowledge-intensive business services operate in two directions:

- Internally, with local businesses, understanding their productive and specialization capabilities and their cognitive needs;
- Externally, providing the district with absorptive capacity for external knowledge.

This presence in the internal and external channels makes it possible to combine and absorb extremely relevant knowledge for the district as a local system of innovation, in particular at an international level.

3.4 New sources of knowledge

Since the moment the transfer and knowledge absorption phases are completed, companies located within the borders can proceed with the generation of new knowledge. The knowledge transferred is rarely used in the original form by the receiving subject; indeed, it almost always becomes a source of new knowledge being originally combined with the counterparty's prior knowledge (Camuffo and Grandinetti, 2006).

The combination of the assimilated knowledge in the innovation that we are trying to imitate with learning by doing, with the experiences and knowledge of the follower company, can lead to the achievement of incremental and radical innovations. In this case, we are not limited to a mere reply, but a recombination takes place, an innovative imitation, integrating this external knowledge with our own knowledge. Further knowledge can be created by combining the knowledge incorporated by the labour force with the knowledge coming from outside.

Finally, new knowledge and innovations can also be created by close and direct collaboration between district companies, involving subcontractors or traders. The sub-suppliers offer access to specialist knowledge in exchange for the advantage received from the learning of the companies, with a consequent development of the assets. Traders, on the other hand, thanks to their relationships with target markets, present themselves as useful information carriers, such as new customer needs.

In the current economic context, the strategic entrepreneurial imperative is to innovate in order to maintain the competitiveness level intact. For this reason, there is a growing demand on the part of small and medium enterprises for internalizing services and competences (Dayasindhu, 2001). Thus, in order to last, the district and clustered realities must progressively begin to relate to the international territory (Belussi and Pilotti, 2002). The first mode corresponds to the external knowledge acquisition, that is related to the acquisition of extra-district knowledge. This learning can manifest itself by hiring professional figures external to the district, engaging in relationships with suppliers and customers external to the district, maintaining relations outside the district, scrutinizing external actors for imitative purposes, valuing individual experiences temporarily away from the district environment, using local institutions in order to connect the two contexts, implying the use of local and external resources in the formation of new business realities. The second form of opening occurs when large multinational groups relate to the districts, with the aim of exploiting local strategic assets, creating new local companies or acquiring existing ones within the district, offering a direct channel with the outside in the mechanism of knowledge transfer.

Finally, the third way to deal with globalization and the related competitive challenges concerns the formation of district-global firms already described. Thus, a global network and interaction comes into action, with which the internal activities relate to the outside. In this way, the companies that take on this district-global dimension conduct a cognitive exchange on an international level, producing new knowledge by integrating their knowledge with that of the external environment.

These radical innovations that are created produce different effects compared to incremental ones, precisely because the absorption and recombination of the enclosed knowledge is extremely difficult for local companies to perform. It therefore agrees that the development of capabilities and competences does not disregard the processes of internal learning by doing. It is of vital importance that the two characteristics coexist in order to internally maximize the coding of external knowledge to be assimilated and absorbed.

In conclusion, on the one hand the district-global companies favour the opening of the borders to the external environment and to new innovations, on the other hand they block the circulation and the recombination of knowledge, grouping together the drivers of development within a scarce number of district companies (Camuffo and Grandinetti, 2006).

A significant example of a district-global enterprise is the Calligaris company, leader of the Chair District of Manzano, thanks in particular to its international strategies.
The first foreign projection began in the 1970s with the first exports to Europe, even if the concrete internationalization began in the early 1990s with the gradual abandonment of the contractor manufacturing and with the progressive refuelling of branches and foreign sellers.
These radical strategic changes have reduced the distributive subordination of Calligaris, allowing it to enter new international markets, satisfying new customer requests, further enhancing the Made in Italy.
Summing up, Calligaris was able to unite the local territorial and entrepreneurial culture with the need for internationalization, obtaining competitive advantages by taking part in an international network of knowledge, information, knowledge and innovations.

In this context, various empirical studies emerge indicating the presence of other models of internationalization, in which the global vision of these local systems does not cause the withdrawal of ties with the residual part of the district (Corò and Grandinetti, 2001).
Examples of this are the district SMEs present in the target or sub-supply markets, with dimensional and strategic characteristics that are very different from the companies described above. These realities present in the end markets, have the objective to develop globally, implementing a strategy that requires quality, innovation and adaptation to the sectoral conditions, and that consists in the supply of goods aimed at particular markets.
This focused strategy, differentiated from those implemented by district-global companies, sees the district or clustered area as a vital pool (of labour, distribution channels, competences, information, knowledge), and for this reason internal relations remain alive (Breschi and Lissoni, 2001).
The subcontractors, on the other hand, have a strong desire to internationalize with the aim of obtaining an expansion of the clientele.
Although it can be imagined that the most arduous challenge for the latter category of companies comes from the external environment, the main problem is the alteration of organization that they must implement to cope with a growing demand and with the task of codifying knowledge, processes and relationships, no longer being the system based on informal relationships and incremental changes.

Finally, even in these district development processes, an important support is given by the role of local authorities, as they must equally favour the fundamental relationships for internal innovation and global openness.

Taking up the clustered model, from an innovative point of view it seems to reproduce more effectively and efficiently than industrial districts.
Among the reasons, firstly the different strategic purposes emerge: the district organizations have the objective of achieving a production of products maximizing quality and minimizing the costs in the input exchange; the clustered organizations have the objective of achieving a continuous and constant production of new knowledge.
From this difference it follows that in the district dimension, mainly labour intensive, the geographical proximity holds a transitive purpose, and cognitive ends for the remaining part. Capital-intensive companies, on the other hand, whose clustered environment is characterized by them, have as their goal continuous innovation and for this reason geographical proximity is exploited with the cognitive and sharing purpose of local knowledge (Dosi, Pavitt and Soete, 1990).
The clusters also modified some district characteristics, in order to improve the efficiency of the innovative process phases.
The first change relates to the composition of the nodes of the local network: public bodies such as universities and public institutions establish relations with companies also in the training of human resources and in the production of knowledge; while in the districts these intra-network relations with these bodies cover only the function of supporting local activities.
Secondly, the degree of openness of the local network to the outside also changes, in order to allow internal companies access to the specialized knowledge produced outside the borders. In fact, these clustered realities, unlike the industrial districts, seem to force on external relations.

In recent years, the investments made in the innovative areas are not facilitated by the productive fabric of our country, structured almost entirely by micro-enterprises and SMEs, encompassing over four-fifths of total employment (Jensen and Szulanski, 2007). Thus, the need arises to simplify the innovative industrial processes within the network, considering the knowledge of public research deriving from the target markets. In order

to use the knowledge produced by research, companies must enhance the relationship between entrepreneurial demand and the offer of research institutions.

Nowadays, as evidenced by Escoffier and other authors, there are sufficiently effective transfer mechanisms and the enhancement of explicit knowledge is supported by local networks including research institutions, or consortia (Escoffier, La Vopa, Loccisano, Puccini and Speser, 2017). We cannot equally say it for the tacit knowledge, whose study has never been properly conducted, although it represents one of the most important resources for achieving a competitive and innovative success (Kabir, 2013).

Recent studies therefore pay attention to investments aimed at forming new entities (usually lead firms), called "knowledge integrators and network knowledge integrators", identifying them in the advocates for procedural development aimed at creating a balance between supply and demand, thus giving complementarity to the set of relations of territorial cognitive and technological transfer (Buzzi and Confessore, 2016).

In this sense, knowledge integrators must allow and assist the mechanisms of diffusion and creation of tacit knowledge, expanding and updating the model of Nonaka and Takeuchi (Nonaka, Toyama and Konno, 2000).

First of all, it is necessary to face the socialization phase with entrepreneurial figures and researchers that allows a first transfer of tacit knowledge. Subsequently, the codification and transformation (through the phase of externalization) of explicit and tacit knowledge is started. Later, it is further converted into explicit, through the combination phase, or through internalization into tacit knowledge. The work of these knowledge integrators and network knowledge integrators is firmly related to entrepreneurial figures to understand the demand, and with research institutions to intercept the new boundaries of knowledge.

3.5 Network knowledge integrators and international upgrading

The global situation and its competition of the last twenty years has changed profoundly, characterized in particular by a competitive levelled environment where national borders are being modified and weakened.

With the support of the eastern and western worlds, with the arrival of new workforce and new companies in the world market, companies, typically belonging to developed countries and already present in the market, have had to face new emerging competitions based on cost leadership.

In order to cope with this competitive advantage achieved by low-cost competitors, existing companies have implemented two strategic processes:

- Production fragmentation on a delocalized scale, mainly in emerging eastern countries, focusing attention on intangible and immaterial assets such as marketing and design;
- Commitment to respect and base competitiveness on production and process diversification.

The division of productive activities at the global level, the global production scattering supported by the multinationals (Coe, Hess, Yeung, Dicken and Henderson, 2004), the consequent weakening of local manufacturing areas and the expeditious expansion of supply chains are trembling the district realities introduced by Marshall (De Marchi and Grandinetti, 2014).

Delocalization to Eastern countries can mainly be found among the strategies of US entrepreneurs, as well as German and in Italian ones. In the latter territory, this strategic model has been most evident in the textile and clothing sector, despite the furnishings, the food and automation industry (the other three main propelling sectors of Made in Italy) continue to prefer a strategic control of production.

Numerous studies, centered on this context, including those conducted by Buciuni and Pisano, have shown that productive and manufacturing control is still preferable and represents a central element in the current innovative and internationalized mechanisms (Pisano and Shih, 2012; Buciuni, Corò and Micelli, 2014).

In fact, the last decades have been characterized by a migration of numerous productive activities, from developed regions to the emerging ones (Dicken, 2003), fuelled not only by the reduction of trade barriers and the extension of international markets, but also by the spin-off of production and products. This profound migration has negatively influenced the regions and districts in question, questioning the survival (De Marchi and Grandinetti, 2014), giving rise to the need to commit in the long term to configure a value chain that includes the situations in which manufacturing activities remain linked to the local context, and the influences that the position has on the levels of productive innovation (Pisano and Shih, 2012; Buciuni and Finotto, 2016).

The regional and international transformations brought about by globalization have enormously interested scholars, politicians, researchers and managers, on the

optimization of production and the division of labour (Marshall, 1890), on the dynamics of industrial localization, on the evolutionary processes of local areas, and on the paths of knowledge and innovation creation (Hannigan, Cano-Kollmann and Mudambi, 2015). Thus, the idea defined by Uzzi as the "paradox of embeddedness" was born, according to which companies must attract new knowledge from external sources (Uzzi, 1997), building knowledge channels with distant communities, avoiding possible and risky cognitive closures (Maskell, 2001).

According to the equation "manufacturing=competitive advantage" traced by different scholars, production still plays the fundamental role of value creation; although there is a simplification and underestimation of the conditions that allow a certain performance, a certain productivity and a competitive advantage.

In other words, we focus on the territorial manufacture and the enhancement of Made in Italy, assuming the fact that innovative processes aimed at internationalization also derive from a combination made up of both a local manufacturing skill and a direct participation in the global market.

Paying attention to this binomial concept, the work of Buciuni and Pisano lends itself to analyzing a sample of companies (knowledge integrators) belonging to different district areas of Made in Italy, which have faced a strategic change based on the constant integration of information deriving from the international market with local production capacity; bringing out how the management of the global final market is based on:

- Direct investments
- Ability to sustain substantial fixed costs;
- Local management capability.

On the one hand, this concept is valid for Made in Italy companies; on the other hand, the prevalence of SMEs still does not hold those resources and inputs to globally compete as a knowledge integrator.

This limit of SMEs, today represents the reason why new projects of network knowledge integrators are being generated, oriented towards access to foreign markets and towards the reciprocal exchange of positioning and internationalization models. The creation of business networks as knowledge integrators allows small and medium-sized enterprises to integrate resources of various kinds in order to directly control and manage global markets.

Starting from the conceptual analysis of knowledge integrator, paying attention to the concept of the network, the authors attempt to provide a model that is a reference for all those small and medium-sized companies called to review their international competitiveness, integrating Made in Italy skills and knowledge of global actors.
Although there is a limitation in the dissemination of knowledge integrators, the integration between manufacturing knowledge and the global market can also take place through representative institutions at territorial level, which act as a support and/or substitute for the integrators themselves.
The study conducted by Buciuni and Pisano, in a certain sense, aims to design the process by which leading companies play the role of connecting local clusters with global value chains, under the term of "gatekeeper of knowledge".
To this purpose, the figure of a leading enterprise within clusters is introduced, which allows a codified circulation of innovative knowledge by simultaneously alternating its presence in the clustered areas and in the multinational value chains.

The literature regarding companies able to integrate knowledge within local manufacturing areas owes its beginnings to the knowledge gatekeeper concept introduced by Allen in 1984, and subsequently by other authors and their related studies, emphasizing the importance of coordination and administration of knowledge channels (Allen, 1984; Grant, 1999).
We have to wait until 1999 with Grant, to have the first explicit notion of knowledge integration, defining it as the basis for a competitive advantage, although not investigating integrative dynamics and beneficiary individuals.
These gaps are filled by the figure of knowledge integrators, providing an analysis aimed at understanding the integrative modalities of knowledge within a cluster. Generally, we can say that these figures, thanks to their competence in setting up and maintaining relationships between the local and international territory, determine the levels of competitiveness and performance of the clusters. Furthermore, the integrator acts as a balance between the globalized and the localized dimension, overcoming this trade-off, integrating its local technical-productive capacities with those particularly innovative deriving from the global market (Pisano and Shih, 2012).
Within this scenario, the leading companies implement huge investments aimed at conserving local productive knowledge and improving the technical and development capacities necessary to participate in global innovation. They also implement stable

connections at a global level with the main international partners, directly accessing knowledge. This external knowledge, after being internalized, is spread among local production through the creation of relationships within the supply chain aimed at strengthening learning processes.

3.5.1 Knowledge integrators and network knowledge integrators

To achieve and maintain a certain level of competitiveness within the globalized scenario, all stakeholders must make continuous updates and improvements regarding their competencies in internationalized value chains. These advances underline the importance of "knowledge connectivity" (Cano-Kollmann, Cantwell, Hannigan, Mudambi and Song, 2016), which translates into the ability to collect and create knowledge from global resources, enhancing the clustered area. So, while it is essential to focus on the role of large companies as a driver of the circulation of knowledge at a global level; on the other hand, it is still strictly necessary to pay attention to the mechanisms of construction of local knowledge (Lorenzen and Mudambi, 2013; Bathelt and Cohendet, 2014).

Introducing the concept of knowledge integrators, we define those organizational systems that operate between a local entrepreneurial ecosystem, such as an industrial district and the global market.

The study conducted by Buciuni and Pisano shows that the advantage of an ecosystem is entrenched in the local participation of medium and large companies permanently present in the international channels of knowledge. In summary, two strategic models of leading companies influence the competitiveness and evolution of clusters:

- Innovation of production processes or produced goods, implementing collaborative activities with local actors and partners;
- Direct access to the international and global market, investing directly, establishing partnerships or implementing foreign branches.

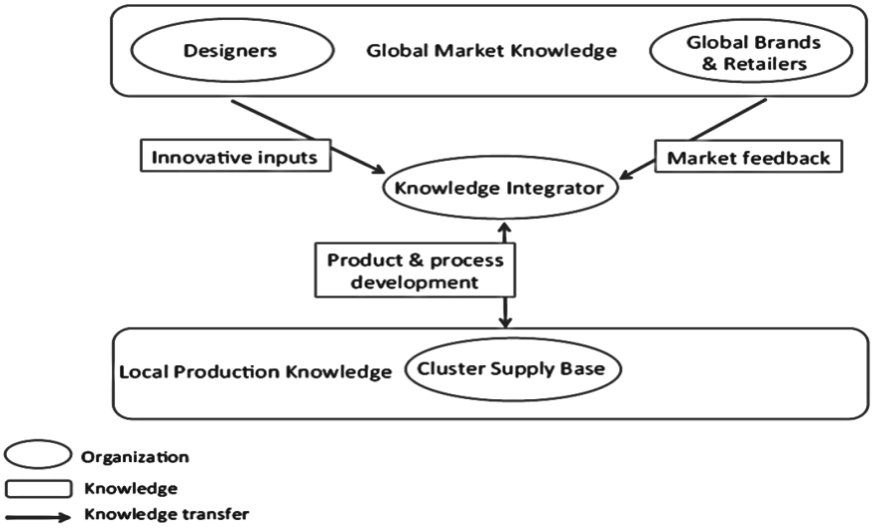
The direct presence in foreign markets does not depend only on the level of company internationalization, but also and above all, on the increase of innovative mechanisms that are the result of close relationships, analysis and partnerships with international actors.

At the time when production in the local area and control of the global market are effectively integrated with each other, they give life to the first competitive source for companies that hold leading positions within the district territories.

The combination also allows SMEs to get in touch with new innovations, progressively perfecting capacities and competences. Small businesses in this context keep themselves away from international competition, concentrating on productive, managerial and logistic capacities, and cooperating in the development of the district's economic and social system (Breznitz and Buciuni, 2015).

In this competitive scenario, the essential prerogative to compete and survive is the presence of companies operating as knowledge integrators within the clusters or districts, playing as a link between the local and global dimension.

Fig. 3.1: Knowledge integrators in industrial clusters



Source: Buciuni G. (2016), *Surviving Globalization: Resilience and Recombinative Capacity in Northeast Italy*, Trinity College Dublin.

The imposition and setting of knowledge integrators have particular influences on the managerial provisions of companies, depending on whether they are leaders or SMEs, and of institutional bodies that collaborate within the district (Buciuni, 2016).

In order to perform the function of knowledge integrator, the following prerequisites must be completed:

- Ability to implement foreign investments;
- Ability to sustain and absorb significant fixed costs;
- Management capability that involve an ability in identifying global players.

Small and medium enterprises, on the other hand, must base their competitive strategies on two factors:

- Ability to make investments in specialized production, using global inputs and information;
- The exploration of collaborative relationships with local productive apparatuses, avoiding the ostentatious pursuit of managerial development within the borders.

The institutions operating in the district are responsible for implementing strategic and political executions, aimed at supporting integrators, operating for example in internationalization and managerial training services (Pisano and Shih, 2012).
As for the support of manufacturing companies, the local institutions that have implemented an internationalization process are presented as real knowledge integrators, facilitating the connection between the local and global system. Further, they deal with the birth or support for training of network knowledge integrators, composed of a plurality of companies.

Focusing on these last two possible district cognitive strategies, we see first how, in the current industrial scenario, local institutions act as knowledge integrators.
Appropriate strategic choices of local businesses and institutions can allow a local area to become a production and innovation hub, focusing on internal investments and safeguarding the economic system threatened by internationalization (Lombardi, 2013).
Although carrying out activities of knowledge integrator, producers and entrepreneurs are not able to offer a complete international evolution and constant upgrading to different latent local producers in particular cognitive and productive competences.
Here, local institutions come into play, as associations that present themselves as a composition of knowledge integrators. This institutional structure ensures a constant integration between international innovations and the productive capacities of small local producers, a coordination and co-development of training courses, an access by local companies with new global ideas and a continuous innovative development of the product and manufacturing.
The second strategy sees instead local institutions covering the role of architect and support in the implementation of network knowledge integrators composed of small and medium enterprises.

The causes that drive local institutions to support the creation of these forms of aggregation are to be found in the needs of SMEs to directly supervise international markets, through large-scale strategies that would otherwise and individually be too complex and expensive. In this way, we achieve a common division of fixed internationalization costs, the diffusion of information, relationships, learning, knowledge and competences, with the consequent enhancement of project results (Lazerson and Lorenzoni, 2008).

The result is a network of companies whose aim is to strengthen their presence on global markets, seeking figures that promote international development and innovation and offer the possibility of structuring continuous controls in these new outlet markets. It can also present itself as a commercial initiative that has the objective of relating and integrating competitive skills of local subcontractors through the implementation of an integrated offer for different types of subjects related to the network.

In this perspective, a collaboration is also promoted between actors, such as designers and regional specialized producers, transforming the district productive ecosystem into a creative and cognitive laboratory.

The temporary and modular feature is important in order to reduce the complexity of managing the network and entry barriers for partner companies (Giuliani, 2005).

These objectives are fundamental for defining the organization or institutional body that will play the role of supporting the creation of the network and coordination of international activities.

Typically, network knowledge integrators have four basic elements:

- A strongly manufacturing local area, generated by the set of companies' skills and resources;
- A combination of the specialized production activities of the different parts operating in the vertical supply chain;
- A strategic model of equal and common international expansion for internal actors;
- Control, supervision and management by an organization or institutional body.

After identifying the key elements, in the next chapter we will analyze how network knowledge integrators are born and evolve in today's economic context.

3.5.2 The management of network knowledge integrators for global markets

As anticipated, in this paragraph we will proceed to the schematization and examination of the birth and growth of these organizational models.

First of all, it is important to underline that the presence of the basic elements described above is flanked by the integration of four procedural phases:

1. Selection of partner companies, based on commercial, technical, cultural and manufacturing criteria;
2. Explanation of an integrated offer deriving from the analysis of the specialized productive activities of the selected companies;
3. Integration of an equal and common strategic model;
4. Implementation of the common strategy through an executive plan.

It therefore becomes indispensable, in order to undertake an analysis of the process steps, to give an interpretation to the concept of the "cluster manager".

In the context of a network of companies, this manager is an equanimous figure (who does not establish preferential relations with the parties, despite having a certain degree of trust between them), equally qualified in the specialization sector of the area, and therefore capable to provide knowledge vital to the clustered environment, ending any conflicts of local interests, such as the choice of the target market, distribution channels, financial resources and penetration strategies (Buciuni and Pisano, 2018).

The integration of a cluster manager that effectively and efficiently respects all the features described above, avoids precisely putting at the head of a network two typical figures that presented important inefficiencies:

- A professional figure linked to the network, like a company signing the agreement, with the risk of creating preferential conflicts of interest;
- A figure independent from the relationship with any company, such as professors or accountants, with the risk of creating gaps in specialized knowledge.

In this context, Buciuni and Pisano show that the most effective figure, in both network knowledge integrators analyzed previously, is that performed by the cluster itself, understood as a supra-district organization (Pisano and Shih, 2012).

1. Selection of partner companies: the first phase for the training of network knowledge integrators within a district is possible only if there is a concrete specialization in the industrial sector concerned. The specialized sectorial knowledge, as we have already

seen, is an essential condition in order to find companies that are compatible in production, technical, social and cultural level. In this step it is preferable that the cluster manager is in possession of a pre-existing sector knowledge and that, through relationships of a direct nature with cluster companies, is effectively able to prefer a specific sample of eligible companies;

2. Explanation of an integrated offer deriving from the analysis of the specialized productive activities of the selected companies: this phase highlights the importance for the network knowledge integrator of relating to the parties, proposing an offer composed of various strategic solutions for the companies that would be impossible to individually or independently implement. The beginning of the second step coincides with a detailed analysis of the production activities of the companies inside the network, usually identifiable through their catalogues. Also in this phase, given the strong communication and marketing inefficiencies of the typical entrepreneurial fabric of SMEs, in order to facilitate the definition of this integrated offer, it is necessary that the cluster manager has a deep-rooted commercial and technical-productive knowledge;
3. Integration of a common strategic model: first of all, it is necessary to premise that this phase is often developed simultaneously with the phase of creating an integrated offer. This fluidity in the execution of the two phases, composed of relationships between the subjects, is due to the fact that in certain cases the required skills are determined by the commercial management of the network itself (Buciuni and Pisano, 2018). Moreover, it is necessary to conduct a thorough market analysis in order to define a shared strategy. Also in this step, the fundamental prerequisite is the presence of a cluster manager with a vast specialized knowledge and an excellent capacity to relate to partners outside the district and clustered boundaries, especially important in identifying new targets at international level;
4. Implementation of the common strategy through an executive plan: the last phase in the creation and coordination of network knowledge integrators is the implementation of an operational action plan, which allows a realization of the shared strategy and an effective transfer and communication of the resources within the network in the target market. As in the previous step, and even more in the case in which the district relates to the international dimension, it is essential to know how to relate to external commercial partners indispensable in organizational and strategic management.

In summary, the management and organization of the network knowledge integrator require the presence of an extremely qualified cluster manager, that establishes internal and external relationships, configuring well-defined and common competitive indicators.

3.5.3 Future challenges and the figure of cluster manager

In-depth studies conducted on network knowledge integrators have revealed a development model that is fundamental for the survival of SMEs in the Italian manufacturing fabric of Made in Italy.

As previously mentioned, the presence of the cluster manager is an indisputable element in the formation of the business network. Reconnecting to the previous paragraphs, in order to be effective this actor must enjoy a vast commercial and technical-productive knowledge, as well as a trust between the companies of the network.

Usually, due to the extreme importance and complexity of this function, the cluster manager identifies itself under organizational rather than individual forms, thus giving rise to the need to invest in the professional training of this figure (Lombardi, 2013).

The definition of this training mechanism involves both companies and institutional bodies, as regards the preparation, design and direction of the training process.

Currently, it is necessary to redevelop the Italian manufacturing areas, in particular regarding the organizational and managerial part. At the same time, it is fundamental to pay attention to the training capable of supporting international knowledge, critical for network knowledge integrators.

The coordination of collaborations with international actors is made weak and risky by the fact that typically the Italian district realities lack “direct” relationships (Lazerson and Lorenzoni, 2008). This gap and this consequent risk can be limited, if not eliminated, in the long term, through direct participation in these markets of the network itself.

Regarding the short term, the most rational choice is the use of specialized professionals, called “globalized” managers, competent in managing relationships and complexity with international subjects, and supported by internal professional figures possibly equipped with previous experience.

Thus, we can agree to the fact that this professional entity represents the new key to achieve an efficient integration of knowledge by manufacturing SMEs that hold specialized competences to support internationalization strategies.

In conclusion, for traditional production clusters there is still the possibility of surviving globalization processes. Summarizing what has been said so far in a vision addressed to future challenges, the existence of clusters is made possible by the search for opportunities present in the global market, parallel and co-existing to the exploitation of local know-how.

The simultaneity strictly depends on the convergence of decisive factors: such as the presence of a knowledge integrator or a network knowledge integrator, who has access to the network of local suppliers and partners in global markets; a complementarity of knowledge in the design and production phases, which makes the decision to regroup locally especially in industries characterized by innovations "incorporated in the processes" advantageous (Pisano and Shih, 2012); and the presence of specialized suppliers within the cluster's industrial organization, capable of transforming this manufacturing specialization into a continuous process supported by the integration of existing capabilities and new external inputs.

Chapter IV
Cluster Arredo/Casa FVG and the Knowledge Economy

In this last chapter we will trace the themes dealt with in the previous chapter concerning the knowledge resource. We will analyze the role it plays in the survival and in the innovative progress of the economic system, compared to the current globalized context, to the new sources for internationalization, and above all to the role that knowledge integrators and network knowledge integrators are hiring during the dissemination of this resource and international upgrading. These themes will thus be transposed into a more focused perspective, aimed at understanding and representing the development and the innovation capabilities of the Cluster Arredo/Casa FVG (Foresti and Moressa, 2019).

The first step will concern to give a more detailed representation of the district realities that characterize the territory of Friuli Venezia Giulia, that are Manzano Chair District and Livenza Furniture District. In these paragraphs we will study the factors of competitive success of the two local areas, retracing the main historical events that have guaranteed such progress, until reaching the most recent slowdown and evolutionary arrest in the last years fuelled by an increasingly globalized context (Lombardi, 2013). This threat and this need for survival coincide with the end of the districts understood as a form of aggregation and with the birth of the Cluster Arredo/Casa representing the two territorial district entities.

After offering a more detailed image of the birth and evolution of the Cluster Arredo/Casa, its role and its objectives, we proceed studying the frequency of innovation activities and knowledge transfer in the clustered area. The purpose of this empirical research will be to analyze the patents produced within the local area and the related patent citations, with the aim of confirming a greater inclination to innovation and to the exchange of knowledge inside these district realities compared to the residual Italian market. The patent study will thus enable us to understand the innovative trend and the relationships created in order to increase cognitive circulation and the consequent economic development (Hall, Jaffe and Trajtenberg, 2001).

Assuming a purely innovative perspective, we will understand this cluster no longer as a mere form of aggregation but rather as a knowledge integrator and network knowledge integrator, focusing attention on the latter as a competitive and innovative driver.

First of all, after briefly outlining the Italian situation regarding knowledge integrators, we will resume the two districts, going to examine them in a cognitive key, trying to enhance and highlight the activities, the coordination and the projects aimed at creating and implementing effective knowledge integrators.

For this chapter, it will be extremely useful and vitally important to relate to the studies of the professors Giulio Buciuni and Gary Pisano, focused on understanding the factors of production, circulation and absorption of knowledge aimed at supporting the competitiveness of local realities. This research thus looks the Italian territory of the North-East, base of highly industrialized aggregate entities, taking as examples two pairs of districts belonging to two different sectors. These pairs, formed by the Footwear District of Riviera del Brenta compared to the Sport Shoe District of Montebelluna and the Furniture District of Livenza as opposed to the Chair District of Manzano, were selected because they both include a constantly evolving and a declining district, due to the global context and therefore they are more likely to define the factors of success and failure of the local territory (Buciuni, 2016).

Following the analysis of the two districts of Friuli as integrators, a more in-depth study of the Cluster Arredo/Casa will be conducted as a network knowledge integrator for the survival of the local area and the districts. We will thus give a representation of the initiatives, projects, activities, strategies and innovations brought by this integrator in order to offer a constant innovative and successful development to the furniture and home system sector (Buciuni and Pisano, 2018).

The chapter will conclude with the new challenges for the cluster, relating to the new processes of internationalization and direct control of global markets. We will consequently focus on recent projects, initiatives and penetration strategies introduced by this cluster with the aim of raising productivity, innovation and the value of Made in Italy.

4.1 Cluster Arredo/Casa FVG as representation of districts

4.1.1 Italian Chair District of Manzano

The birth of the Manzano Chair District, also called Italian Chair District, coincides with the end of the 19th and the beginning of the 20th century, when the manufacturing companies, mainly composed by small specialized craftsmen born around the eighteenth century, developed in the territory circumscribed by the municipal areas of Corno di Rosazzo, Manzano and San Giovanni al Natisone. In this period, important agreements

and family relationships were born between the entrepreneurial entities of this local productive reality, transforming the area from rural-artisan to industrial. Moreover, in these years the first infrastructural developments such as the creation of bridges, railways, but also training schools, made possible to make this territory an attractive source for other companies which in turn improved the productive aspects.

The expansion and development of the district maintained a strictly constant trend until the early 1900s. First World War wiped out more than two-thirds of the local manufacturing force, even though during the following decade entrepreneurial realities quadrupled to form a close network of relationships, guaranteeing a phase of development that lasted until the crisis of '29 (Lombardi, 2013).

In this first half of the 1900s the district also suffered heavily from the fascist policies which, although the internal demand increased, drastically closed the international supply relations, increasing the costs of the workforce and raw materials. This crisis culminated with the Second World War, which determined the end for many small artisan and family businesses that characterized the productive territory of Friuli Venezia Giulia.

The economic revitalization of the 1970s led to significant increases in the levels of domestic demand, employment and investments, also by foreign actors, aimed at territorial specialization and industrialization. These are the years that correspond to the dawn of "Made in Italy" and its role as the locomotive of Italian economic and manufacturing fabric. It was at the end of this decade that the oil crisis, the devaluation of the currency and the historic earthquake of 1976 again stopped the progress of this district area.

The last years of the twentieth century were characterized by new processes and development strategies aimed at the reform of the district, giving importance and role to the manufacturing aggregative forms, which through dense relations, succeeded in satisfying the new needs of the target markets, starting to globally commercialize (Foresti and Moressa, 2019).

At the moment, the new millennium has seen the end of many SMEs unable to adapt to new challenges, leaving space for new productive aggregations, related to each other with the aim of reacting to modern changes in the world economic system through innovative processes, also obtaining an interest from international actors capable of transforming and further improving the internal territory. Although the years of the crisis have drastically

reduced the business population of the district, the last few years have seen an increase in specialized companies (Table 4.1).

Currently, the Manzano Chair District in Friuli Venezia Giulia is located in an extended industrial manufacturing area of the furniture sector of about 224 km^2 which involves more than 3,700 companies belonging to the sector and more than 600 companies specialized in the production of chairs, divided into 11 municipalities of Udine, that are Manzano, Corno di Rosazzo, San Giovanni al Natisone, Chiopris Viscone, Aiello del Friuli, Buttrio, Trivignano Udinese, Pavia of Udine, San Vito al Torre, Premariacco and Moimacco (Tab. 4.2).

Tab. 4.1: Population of enterprises belonging to the district from 2009 to 2016[1]

Years	Specialized companies		Companies specialized in the Region	
	v.a.	Var. %	v.a.	Var. %
2009	752	/	2,796	/
2010	724	-3.72 %	2,718	-2.79 %
2011	700	-3.31 %	2,656	-2.28 %
2012	660	-5.71 %	2,517	-5.23 %
2013	642	-2.73 %	2,432	-3.38 %
2014	644	+0.31 %	2,378	-2.22 %
2015	629	-2.33 %	2,316	-2.61 %
2016 (1st sem)	640	+1.75 %	2,301	-0.65 %

Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

Tab. 4.2: Data on the Manzano Chair District in 2016[2]

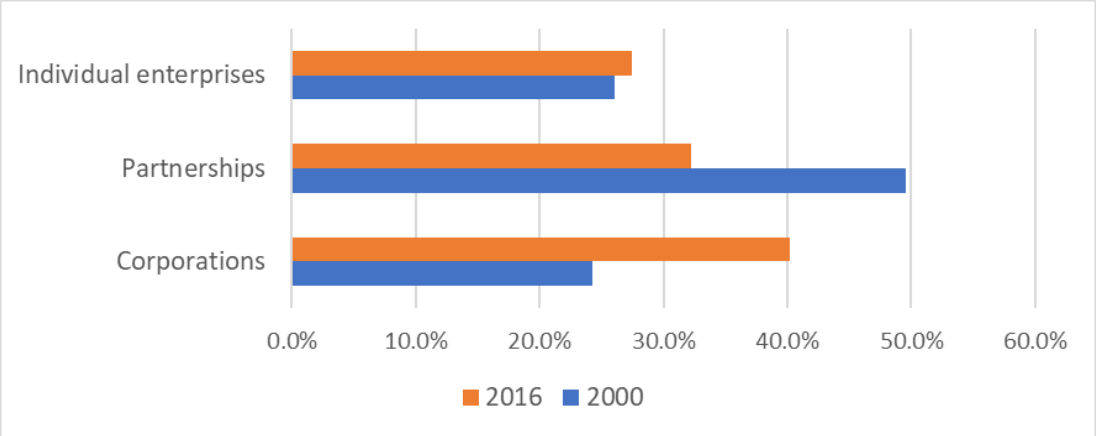
	District area	% District area on the Province
Surface	224 Km^2	4.6%
Residents	37,453	7.0%
Companies	3,792	8.5%
Production units in the manufacturing industry	1,179	19.7%
Production units in the wood-furniture supply chain	831	48.9%
Employee in the wood-furniture supply chain	4,400/5,000	50.0%
Craft enterprises in the wood-furniture supply chain	443	41.9%

Source: Foresti G., Moressa A.M. (2019), *L'industria del mobile tra tradizione e innovazione*, Intesa San Paolo, Direzione studi e ricerche.

[1] [2] After the first semester of 2016 there are no data available concerning the Italian Chair District since in 2015 Cluster Arredo/Casa FVG was established, in compliance with regional law 3/2015, as a "joint" representation of the Manzano Chair District and Livenza Furniture District.

The changes in the market and in the globalized context in which we operate have forced companies to revise their legal nature in order to reduce costs and risks in order to develop and innovate. In these fifteen years, in fact, there have been a drastic reduction in the number of partnerships, which they have left place to individual companies and above all to corporations (Fig. 4.1).

Fig. 4.1: Trend in the legal nature of district businesses, 2000 vs 2016[3]



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

In recent years, the district, which has become part of the Cluster Arredo/Casa together with the neighbouring District of Furniture of Livenza, has been the subject of projects aimed at the requalification and revitalization of the sector's production department in the Friuli region, avoiding a continuous deterioration of territory, resources and raw materials. The projects include the allocation of € 3.6 million for the recovery of artisanal, industrial or commercial production facilities in the Italian Chair District area, as well as contributions to be granted to companies for infrastructural and redevelopment purposes. These are the period of the start of internationalization, which processes are slowly bringing the district back to pre-crisis levels (Tab. 4.3).

[3] After the first semester of 2016 there are no data available concerning the Italian Chair District since in 2015 Cluster Arredo/Casa FVG was established, in compliance with regional law 3/2015, as a "joint" representation of the Manzano Chair District and Livenza Furniture District.

Tab. 4.3: Import and Export trend of wood products from 2007 to 2016[4] (Thousands of euros)

Years	Import		Export	
	value	Var. %	value	Var. %
2007	223,135.15	+3.81 %	765,472.82	-3.59 %
2008	182,702.64	-18.12 %	700,354.71	-8.51 %
2009	144,512.92	-20.90 %	527,114.38	-24.74 %
2010	164,075.98	+13.54 %	544,477.28	+3.29 %
2011	173,028.43	+5.46 %	539,950.80	-0.83 %
2012	160,983.70	-6.96 %	570,144.87	+5.59 %
2013	150,329.28	-6.62 %	530,395.13	-6.97 %
2014	165,996.54	+10.42 %	538,180.93	+1.47 %
2015	159,653.78	-3.82 %	536,474.88	-0.32 %
2016 (1st sem)	83,373.33	+3.01 %	268,184.46	-0.02 %

Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

The first mechanisms of change and transformation of the district began in 2012, giving rise to new consolidated entities, connected by a dense network of intra, extra-district and international relationships and collaborations. These instruments, closely combined with new knowledge and new forms of learning, have improved innovations in products and processes, creating integrated management systems. It is important to underline that these industrial, technological or purely manufacturing innovations have also been supported by initiatives and institutions aimed at training new professional figures capable of developing and innovating the local production context (Lombardi, 2013).

All companies, institutions and centers that operate within this territory relate to and aggregate with the aim of innovating in sectorial production activities, through a combination of modern know-how and specialized local and traditional manufacturing knowledge. In this way, the productive and procedural variety of the district focuses on an effective, productive, collaborative, consolidated, technically and industrially specialized local economic fabric. Then, this system becomes able to fulfil the international needs of the global economy, sometimes integrating the know-how coming from foreign channels with local and specialized knowledge, obtaining new knowledge and innovations in products, projects and strategies (Buciuni and Pisano, 2018).

[4] After the first semester of 2016 there are no data available concerning the Italian Chair District since in 2015 Cluster Arredo/Casa FVG was established, in compliance with regional law 3/2015, as a "joint" representation of the Manzano Chair District and Livenza Furniture District.

4.1.2 Furniture District of Livenza

Concerning the Livenza Furniture District, there is no rich documentation of the development it enjoyed during its evolution.

Born in a flat geographical area characterized by a specific company composition and an industrial distribution rich in relationships initially promoted by new infrastructures linked to transport and trade, this district followed an initial evolutionary path parallel to the adjacent district in Manzano.

The 1950s were characterized by a shift from the family artisan reality, mainly made up of shops, to real industrial companies, influenced by an increase in articulated demand, by the introduction of new resources and raw materials, by new specializations and by technical and industrial innovations, which contributed to cognitive and productive spill-over mechanisms.

This period of economic and district expansion lasted until the early 1970s, where a decline in domestic demand drastically slowed local production development. In order to find new demand, and therefore a new target market, the district implemented strategies aimed at selecting new innovative processes, such as decentralization and delocalization of production, vertical specialization, productive fragmentation of the labour force and the reorganization of the production and value chain. In this period the local area was focused on the company control and on the maintenance and management of the dense network of relationships that allowed an informative and cognitive exchange that took place inside, as a source of innovation and development for the district itself (Buciuni and Pisano, 2018).

The second half of the decade was marked by an alteration in competitiveness, influenced by the new processes of internationalization and global projection. Focusing on strategic, managerial, organizational, productive, qualitative and industrial reforms, the district was able to create innovative programs and strategies capable of relating the local reality to the international market and guaranteeing a continuous district development.

In the last twenty years of the twentieth century the district has been able to further evolve while maintaining a competitive advantage, knowingly adapting to new external and global needs, driven by productive reorganizations, by an increase in the levels of both internal and external demand triggered by globalization processes and in particular by new exchanges of information, knowledge and technologies.

The 90s are also the years in which the first legislative testimonies concerning the industrial districts in the Italian territory are born. With the first subparagraph of the law

n. 317 of 5 October 1991, districts were defined as "local areas where small businesses are highly concentrated, paying specific attention to the relationships between the population of companies, as well as their specialization, and the resident community". During this period there was subsequent additions, such as decrees that established criteria for identifying districts such as the Decree of the Ministry of Industry of Trade and Crafts of 1993, production regulations such as law n. 140/1999 and new concepts that left more freedom in identifying district realities (Foresti and Moressa, 2019).

This is the decade in which the first legislative evidence of this district appears, recognized for the first time in the Regional Law of Friuli Venezia Giulia n. 27 of 11 November 1999.

The Livenza Furniture District thus becomes a productive hub concentrated in 11 municipalities of Pordenone, with the aim of requalifying and revitalizing the wood-furniture sector by solving the constant problems of the sector and of the Italian and local economic fabric. It was through the act of the Regional Council n. 457 of 3 March 2000 that the Furniture District was actually established and recognized.

Among the main organizations recognized within the District of Livenza we highlight first of all the District Committee, representative body of the interested subjects such as the province, the municipalities, the association of industrial enterprises, artisans, trade unions and the Chamber of Commerce.

This representative structure has been supported since 2002 by the district operating body, composed by the Consortium and consisting of an entrepreneurial aggregation encompassing municipalities, provinces, companies, bodies and associations aimed at the common protection, promotion and development of the district.

Specifically, the Consortium aims to give value to businesses and to the local territory, promoting innovative development and raising awareness in the target markets through relations between district companies and external partners and actors. To this purpose, the Consortium must pay attention to the factors relating to the formation and birth of new professional figures that support development processes, capable of protecting the territory and the local economic, cultural and social fabric, also offering services capable of satisfying the interests and the needs of aggregate companies.

This body has constantly promoted the development of the district, implementing numerous projects and initiatives in different fields, from technological innovation to environmental protection. Among the most important ones we consider appropriate to

underline and give a brief presentation to the national pilot project born from a public body, known as the EMAS project, aimed at environmental protection, territorial promotion and the competitive advantages that can be achieved through this environmental certification (Buciuni and Pisano, 2018; Foresti and Moressa, 2019).

At the dawn of the new millennium, in the Italian territory, the Furniture District of Livenza, located in the municipalities of Azzano Decimo, Brugnera, Budoia, Caneva, Chions, Fontanafredda, Pasiano di Pordenone, Polcenigo, Prata di Pordenone, Pravisdomini and Sacile, at the productive level was second only to the Milan Furniture District.

As previously announced, the Livenza District is restricted within these 11 municipalities recognized by the Regional Law 27/1999 and subsequently by the resolution of the Regional Council n. 411 of 2007. Given the progress of the last few years, with resolution n. 126 of 2012 the municipalities of Pordenone, Porcia, Roveredo in Piano, San Quirino, Cordenons, Zoppola, Fiume Veneto and San Vito al Tagliamento were added to the district area.

Its evolution has led to territorial expansion, localizing itself between Friuli Venezia Giulia and Veneto, thus also attracting the province of Treviso, affecting the municipalities of Chiarano, Cimadolmo, Cessalto, Codognè, Cordignano, Fontanelle, Gaiarine, Godega, Gorgo al Monticano, Mansuè, Meduna di Livenza, Motta di Livenza, Ormelle, Orsago, Ponte di Piave, Portobuffolè, Salgareda and San Polo di Piave.

During the three-year period from 2011 to 2013 the Livenza Furniture District was characterized by the implementation of an extraordinary strategic plan aimed at strengthening the competitive advantage of the district and furniture companies, acting on three specific contexts.

The first intervention was related to the corporate organization, going to restructure the organization through support dedicated to SMEs and to the consolidation of relationships under an integrated network that allows a continuous and stable flow of projects, resources, know-how, activities of research, development and training.

This process of re-launching the district was accompanied by innovations implemented in the environmental sphere, concerned with sustainability, cost and waste reduction, recycling and the use of natural resources that require an high use of technology and know-how. In this way the district was able to implement innovative development processes with regard to energy needs, environmental protection, competitiveness, technology and productive economy.

The last field of action of the strategic plan concerns the revaluation and enhancement of the productive and manufacturing peculiarities of the Italian districts (quality, design, Made in Italy), which would be able to feed the internationalization processes through the establishment of a network of direct distribution. The preparation of an integrated product policy and an environmental brand, that enabled sustainable and innovative production, have given the district the opportunity to survive the globalized context, penetrating new international markets in a stable and direct manner, further improving its competitiveness and producing new development (Buciuni and Pisano, 2018).

Currently, the Italian districts are trying to face the new challenges arising from the innovative internationalization and globalization processes that are affecting the economic tissues of the nations.

These territorial realities, still composed of a small number of large entrepreneurial realities able to relate to the market and of a conspicuous presence of specialized SMEs, succeed in an effective and flexible way to respond to the new global context, even if in recent years they have had to implement structure modification processes. The district, understood as the highly and densely specialized ecosystem, is thus represented by a new form of clustered aggregation with the aim of supporting and nurturing the innovative development phase of the territory.

In our case, this new entity introduced by a regional regulation of 2015 is the Cluster Arredo/Casa FVG, also simpler called Cluster A/C FVG, representing the Livenza Furniture District and the Italian Chair District of Manzano. In this way, they are no longer understood as consortium entities, but only as territorial entities embodied by the Cluster A/C that incorporates and pursues the consortium objectives in a more articulated, efficient and innovative way.

In fact, 2015 was defined as the year of the true international projection of the two districts represented by the cluster, which included among the main factors of its competitive advantage the network of collaborations with multinational giants such as Ikea and Leroy Merlin that related with about thirty local companies, including the leader ones Friul Intagli, Media Profili and 3B.

These relationships required flexible and effective innovative changes by local entities, but on the other hand they introduced knowledge and innovations from the global context into the territory. Then, in that year exports of the two territories reached 2.5 billion euros, contributing to more than 25% of Italian exports of the sector, and registering almost a

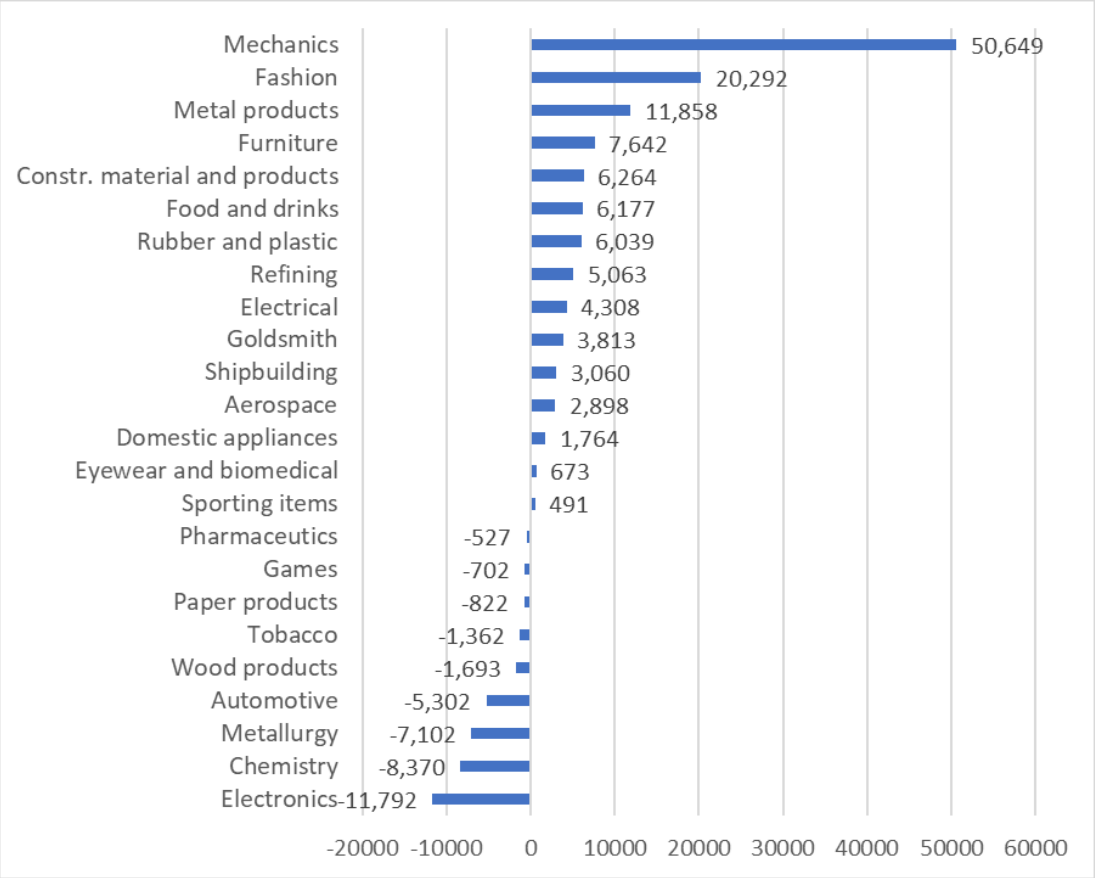
doubling of recruitments. Nowadays, the two districts, with around 3,000 companies and 20,000 professional figures, take on an international projection, contributing to the 70% of the exports made by the Friuli districts (Grandinetti and Bortoluzzi, 2004).

4.1.3 Cluster Arredo/Casa FVG

To understand the vital importance of the Cluster Arredo/Casa on the territory and on the cluster itself, we must first give a representation of the economic importance of this sector for the national economy.

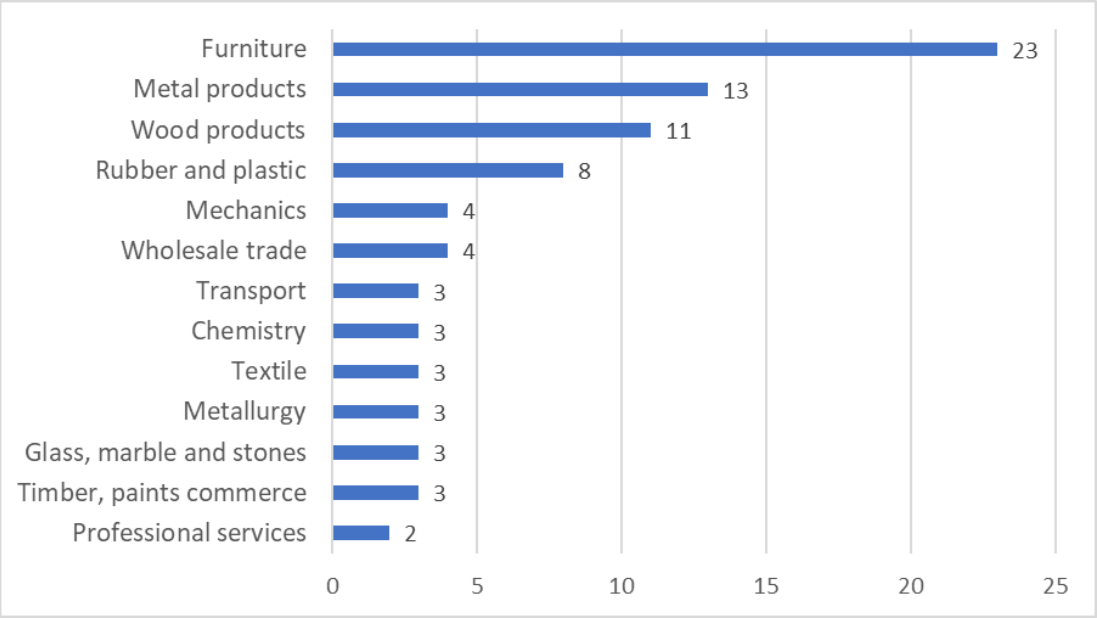
Nowadays, the furniture sector is the fourth in the ranking for trade surplus and the first for the supply of imported raw materials, with more than 8% of the manufacturing total of € 94.1 billion, involving around 18,600 companies for a total of over 130,000 employees and almost € 23 billion in turnover (Fig. 4.2; Fig. 4.3) (Foresti and Moressa, 2019).

Fig. 4.2: Italian sector trade balance in 2018



Source: Foresti G., Moressa A.M. (2019), *L'industria del mobile tra tradizione e innovazione*, Intesa San Paolo, Direzione studi e ricerche.

Fig. 4.3: Sectorial proportion of supply on total imports in 2018 (%)



Source: Foresti G., Moressa A.M. (2019), *L'industria del mobile tra tradizione e innovazione*, Intesa San Paolo, Direzione studi e ricerche.

As already mentioned, one of the abilities of the Friuli Venezia Giulia territory and more properly of the Friuli districts was to be able to aggregate in clustered forms in order to survive the new phases of internationalization and globalization, albeit modifying their structure.

In compliance with this objective, the Regional Law 3/2015 has identified the Cluster Arredo/Casa FVG as the Innovation Pole for the development of the cluster itself, representing the two Friulan districts of the home furnishing sector. This law, in Article 15, defines the cluster as the figure dedicated to the innovative development of the industrial sectors of the two districts (Livenza and Manzano) recognized in Article 54 of the same Regional Law.

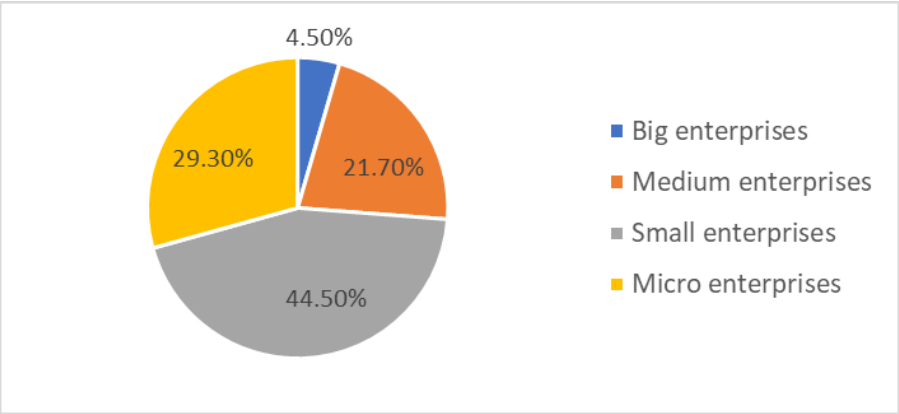
Subsequently, maintaining as goal the achievement of a competitive advantage in the global context, the Regional Law 37/2017 entrusts the clustered entity with the task of extending and improving the strategic supply chain, managing and implementing regional, national or international policies, directives and regulations.

Thus, the cluster appears as a private consortium company with limited responsibility, which connects companies, organizations, institutions and various highly specialized professionals through a dense network of collaborative relationships, active in innovative development.

Like the district realities, it is composed of a large number of SMEs and a few large and highly incident companies that cover the role of lead firms and gatekeepers (Fig. 4.4; Fig. 4.5).

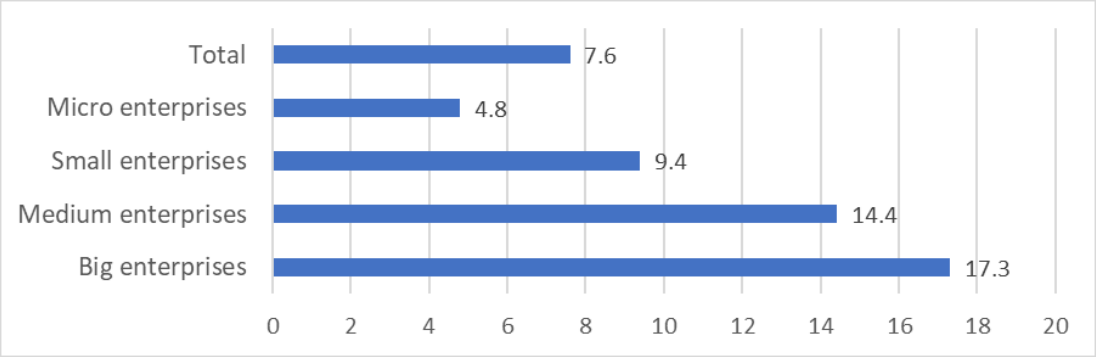
The main functions offered by the cluster include the promotion of any form of aggregation (from companies to districts and to the cluster itself) aimed at the international development of the local area, directly and permanently accessing the final foreign markets and attracting the attention of international actors through an evolutionary and innovative phase. Through services, projects, initiatives and certifications to support companies and stakeholders within the cluster, the clustered consortium company is able to effectively manage the supply chain and the value chain. In particular, the Cluster A/C firmly focuses on the transfer and dissemination of new knowledge and competencies, mostly in support of production, capable of qualitatively internationally raising the local system.

Fig. 4.4: Composition by company size in the regional furniture sector in 2018



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

Fig. 4.5: Incidence by company size of the regional furniture sector in 2018 (%)



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

In 2015, thanks to the establishment of the new cluster, the production chain of the home furnishing sector recorded a 7% increase in the turnover of the two districts (3 billion euros), a doubling of employment in the district furniture area of Livenza and an 80% increase in those of the Chair District compared to the previous year.

Following the path of internationalization as the main mission of the cluster, this manufacturing area increased exports by 7% compared to 2014, reaching the quota of 1.5 billion euros, equal to 13% of the nation's exports.

In 2016 we see the aggregate introduction of new actors, mostly represented by institutional bodies, such as the regional banking system, Confartigianato, Confindustria, Unindustria and Federlegno. In this year the cluster experiences significant organizational reforms, focusing on the management of the networks created between companies and actors that relate inside and outside the cluster in order to offer the territory new sources of development, such as initiatives, certifications and a constant exchange of knowledge and learning abilities. By expanding and further consolidating the network, involving new subjects such as universities and new research and training centers, the new-born pole of innovation represented by the cluster contributed to the support of 7 networks and 93 certifications, which resulted in the improvement of the productive apparatus, in an increase of 165% in revenues and 120% in manufacturing compared to 2015.

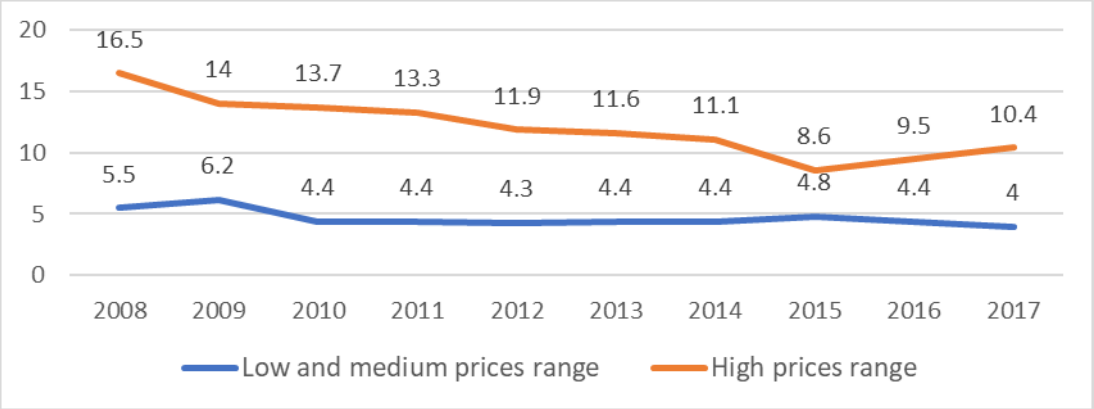
The development registered in these years since the establishment of the cluster has attracted the attention of new investors and financiers who see in this territory an innovative and industrial development hub capable of connecting the national and local fabric with the external international reality.

In fact, in 2017 the Cluster Arredo/Casa received a financing ceiling of 150 million to support innovative development strategies, offering the local area an investment flow of € 66.5 million in turnover. These processes refer to internationalization mechanisms, mainly based on the technological progress produced by the fourth industrial revolution (4.0 technology) and on the innovation offered by the network established between the cluster and the outside, with the aim of improving the supply chain, the value chain, the production chain, the value of Made in Italy and the national and international competitiveness.

During this period, the Furniture District was able to realize a trade surplus of € 746 million, increasing exports by 15%; while, the Italian Chair District, following the same evolutionary line even if in a more tenuous way, obtained an annual growth of about 3%.

The production, organizational and strategic development and innovation processes address the clustered market towards productive and Made in Italy valorisation, pressing on the marketing of Italian products located in high price ranges, bearing witness to an high degree of design, quality, efficiency and technology (Fig. 4.6) (Buciuni and Finotto, 2016).

Fig. 4.6: Trend in the market shares of the furniture sector depending on the price range from 2008 to 2017 (%)



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

In this year the clustered area saw the involvement of a total of 2,545 companies (more than 20% of the regional manufacturing industry), with exports amounting to € 1.55 billion, participating in almost 10% of the total exports of the Italian furniture sector. The international projection assumes a direction towards new emerging global markets, such as the Asian countries (i.e. China, Singapore, Vietnam and Russia), characterized by ever-increasing demand, albeit maintaining direct access to vital markets such as the United Kingdom, Germany, France and the United States. In December 2017, the exports of the Cluster A/C FVG recorded an increase of 10% compared to the previous year, reaching € 1,546,727 thousand (Tab. 4.4).

Tab. 4.4: Cluster Arredo/Casa FVG data in 2017

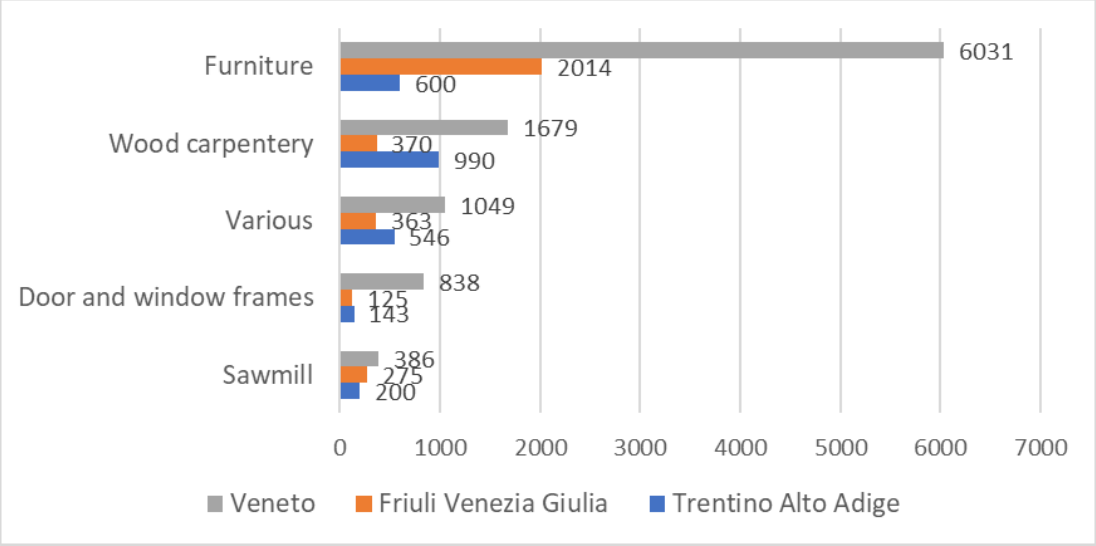
	Cluster Arredo/Casa FVG	Regional manufacturing industry	% Wood-furniture
Localizations	2,545	12,211	20.8 %
Employees	19,800	111,600	17.0 %
Export (mln €)	1,546.73	14,321.57	10.8 %
Import jan-sep (mln €)	381.16	7,752.37	4.9 %

Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

The development process also involved 2018, reaching 10 business networks involving 70 new companies. The mission pursued is always the internationalization and global competitiveness, capable of combining local specialization with knowledge and the international context (Buciuni and Pisano, 2018).

In this year, the Cluster Arredo/Casa reached a production quota of € 850,000, with an increase of more than 10% compared to the previous year. At the end of the year the wood-furniture sector of the cluster registered 2,493 specialized companies, equal to 20.5% of the manufacturing industry of Friuli Venezia Giulia, involving more than 23 thousand employees, equal to 20.9% of the regional manufacturing industry, which allowed them to reach 1,607 million euros in exports (Fig. 4.7).

Fig. 4.7: Number of companies in the Triveneto wood and furniture sector in 2018

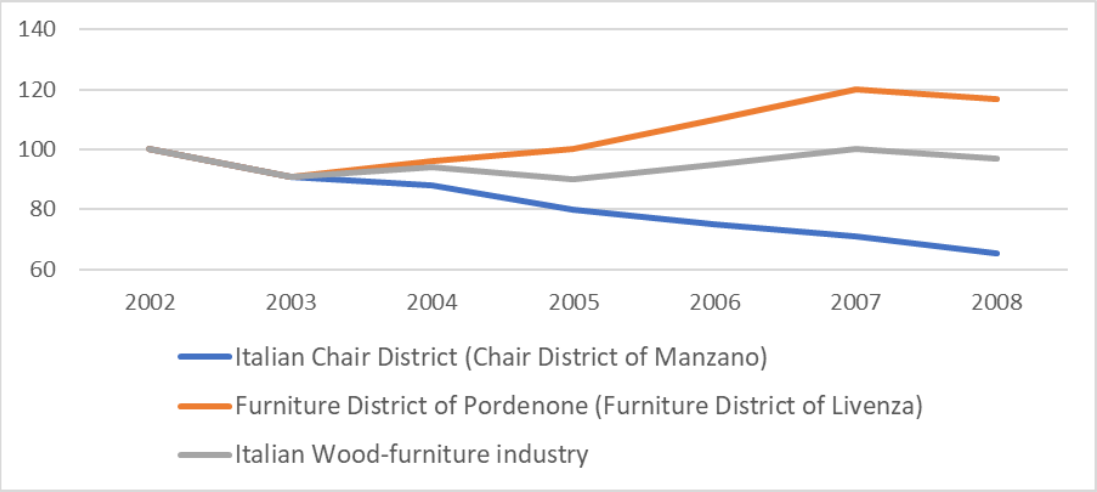


Source: Foresti G., Moressa A.M. (2019), *L'industria del mobile tra tradizione e innovazione*, Intesa San Paolo, Direzione studi e ricerche.

This progress was made possible by numerous certifications (which increased by 47% compared to 2015) and initiatives, such as the establishment of the ICIDE company (International Center of Interior Design), aimed at supporting and developing the knowledge of Made in Italy and of its value in the penetration processes of foreign markets, connecting foreign partners and actors with the local production system characterized by the presence of SMEs. These initiatives and certifications, which we will analyze more appropriately in the following paragraphs, have been crucial for the survival of the cluster in a globalized perspective, contributing particularly to the development and circulation of knowledge and innovation.

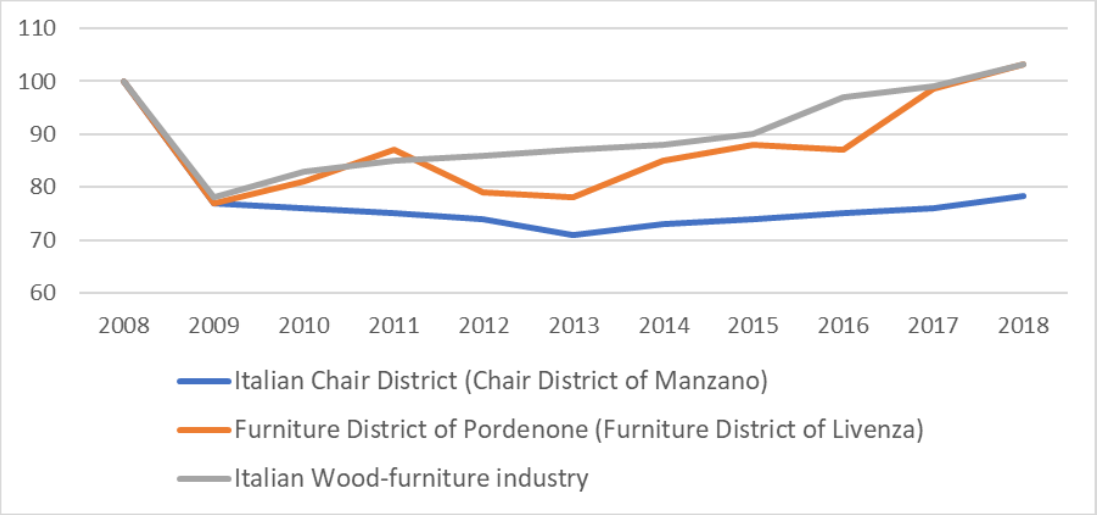
It is evident that clustered aggregation has given vitality to the two districts heavily affected by the crisis and globalization, especially in the field of internationalization, contributing to the increase in exports (Fig. 4.8; Fig. 4.9).

Fig. 4.8: Export performance trend of the districts and the supply chain trend from 2002 to 2008 (2002=100)



Source: Foresti G., Moressa A.M. (2019), *L'industria del mobile tra tradizione e innovazione*, Intesa San Paolo, Direzione studi e ricerche.

Fig. 4.9: Export performance trend of the districts and the supply chain trend from 2008 to 2018 (2008=100)



Source: Foresti G., Moressa A.M. (2019), *L'industria del mobile tra tradizione e innovazione*, Intesa San Paolo, Direzione studi e ricerche.

4.2 Empirical analysis of the innovation activity and knowledge transfer in the Cluster Arredo/Casa FVG

4.2.1 Analysis of the innovation activity within the Cluster A/C

Having described and represented the productive and evolutionary characteristics and peculiarities of the districts of Manzano and Livenza and even more important of the Cluster Arredo/Casa FVG, we will analyze the innovation activity and the knowledge exchange of the clustered area. In this way we will try to confirm that there is a greater propensity for innovation and transfer of knowledge within these district realities compared to the rest of the Italian market.

Through the study of local areas, we have ascertained that the characteristics are in line with the Italian and international literature of the districts, such as an high entrepreneurial density within the circumscribed territory and a population mainly composed of small and medium enterprises typical of the Marshall districts. To confirm this, proof is given of how the population of companies in the sector is thickened within delimited industrial areas, such as the Furniture Districts of Brianza and Verona and the Cluster Arredo/Casa FVG, the latter encompassing 2,493 companies (approximately 20.5% of the regional manufacturing industry), where 66.2% is composed by SMEs and 29.3% by micro enterprises.

After having confirmed a greater presence and density of companies, mostly SMEs, within districts and clusters, we proceed with the empirical analysis of the innovation of the Cluster A/C. The aim of the research is therefore to find a greater innovative inclination within the borders and at a later time to measure the variations and the innovative trend during the recent evolutionary phase. Finally, the survey will conclude trying to highlight the importance of the networks of relationships that are created in the districts as knowledge flows.

Among the various methods for measuring the innovative performance of a form of aggregation, we opt for the study of patents issued within the area. This decision and preference was produced by the fact that the analysis of these outputs gives us a more transparent and truthful representation of the degree of innovation with respect to the study of inputs such as investments destined to research and development activities, since the latter do not always originate innovations and not always the innovations (in particular the cumulative ones) are originated by investments in R&D (i.e. knowledge spillovers) (Jaffe, Trajtenberg and Henderson, 1992; Hall, Jaffe and Trajtenberg, 2001). The patent,

representing a temporary exclusive property in exchange for informative disclosure, is granted only to innovations with commercial value and for this reason it represents an excellent unit of measurement of innovation. Furthermore, they incorporate precise information and details (accessible to all free of charge) regarding the product, the owner, the inventor and the previous knowledge used to achieve this innovation (Hall, Jaffe and Trajtenberg, 2001).

For the patent study we used the Italian patent database for industrial invention of the "Ufficio Italiano Brevetti e Marchi", containing 34,399 patents filed between 1st July 2008 and 30th June 2015[5] classified according to the information available, such as the product category, the inventor, the owner, the date, the number and the place of application, deposit and concession. In addition, the UIBM database operates in compliance with the International Patent Classification (IPC) drafted following the Strasbourg Agreement of 1971, dividing patent inventions into eight sections (A-H), divided on their turn into other subsections, classes, subclasses, groups and subgroups, which are subordinated and increasingly specialized.

The empirical analysis was then conducted by observing all the patented technologies and innovations relating to the wood-furniture industry, examining the information contained in the 2,351 patents filed from 1st July 2008 to 30th June 2015 in the following categories:

- Section A: "Human necessities";
  - Subsection: "Personal or domestic articles";
  - Class 47: "Furniture; domestic articles or appliances; coffee mills; spice mills; suction cleaners in general";
    - Subclass B: "Tables; desks; office furniture; cabinets; drawers; general details of furniture";
    - Subclass C: "Chairs; sofas; beds";
    - Subclass D: "Furniture specially adapted for children";
    - Subclass F: "Special furniture, fittings, or accessories for shops, storehouses, bars, restaurants, or the like; paying counters";
    - Subclass G: "Household or table equipment";
    - Subclass H: "Furnishings for windows or doors".

[5] There are no data after 30th June 2015 as the patents filed at a later date have not yet obtained a concession (due to the very long iter of more than 30 months to obtain the concession).

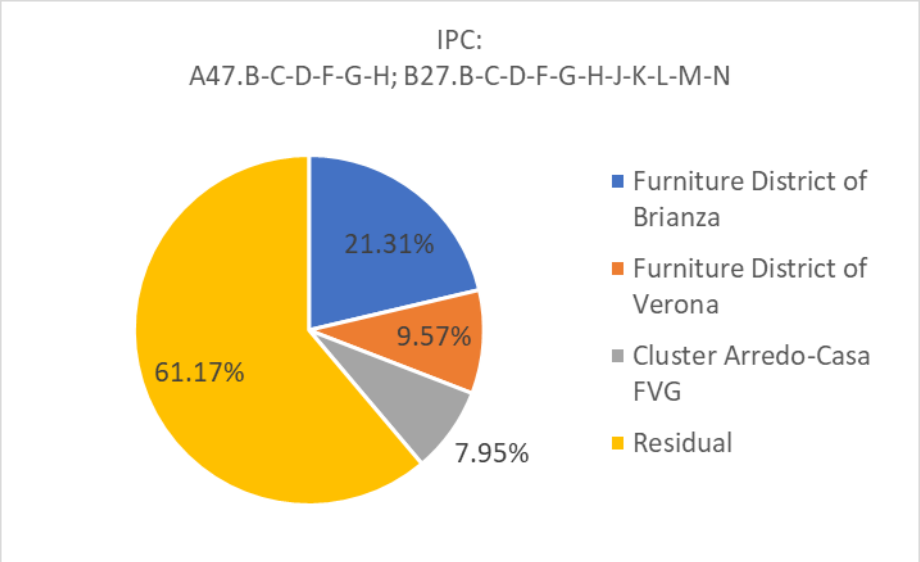
- Section B: “Performing operations; transporting”;
  - Subsection: “Shaping”;
  - Class 27: “Working or preserving wood or similar material; nailing or stapling machines in general”;
    - Subclass B: “Saws for wood or similar material; components or accessories therefor”;
    - Subclass C: “Planing, drilling, milling, turning or universal machines for wood or similar material”;
    - Subclass D: “Working veneer or plywood”;
    - Subclass F: “Dovetailed work; tenons; slotting machines for wood or similar material; nailing or stapling machines”;
    - Subclass G: “Accessory machines or apparatus for working wood or similar materials; tools for working wood or similar materials”;
    - Subclass H: “Bending wood or similar material; cooperage; making wheels from wood or similar material”;
    - Subclass J: “Mechanical working of cane, cork, or similar materials”;
    - Subclass K: “Processes, apparatus or selection of substances for impregnating, staining, dyeing or bleaching of wood, or for treating of wood with permeant liquids, not otherwise provided for; chemical or physical treatment of cork, cane, reed, straw or similar materials”;
    - Subclass L: “Removing bark or vestiges of branches, splitting wood; manufacture of veneer, wooden sticks, wood shavings, wood fibres or wood powder”;
    - Subclass M: “Working of wood not provided for in subclasses B27B-B27L; manufacture of specific wooden articles”;
    - Subclass N: “Manufacture by dry processes of articles, with or without organic binding agents, made from particles or fibres consisting of wood or other lignocellulosic or like organic material”.

Through a first purely geographical observation, determined by the origin of the owners, we can see how the 2,351 patents belonging to the subclasses listed above are mainly concentrated in the industrial and manufacturing areas with the highest concentration of companies in the wood-furniture sector (Fig. 4.10).

Keeping the Districts of Brianza and Verona and the industrial area of the Cluster A/C as survey regions, we note that these industrial territories represent the origin of about 40% of all Italian patents of interest produced since 2008 to 2015.

The fact that only these three district and clustered forms respectively hold 501, 225 and 187 patents is another point that reinforces and consolidates the idea that within the districts the levels of innovation and innovative development are higher compared to other residual areas.

Fig. 4.10: Composition of patent of wood-furniture sector from 1st July 2008 to 30th June 2015[6]



Source: Database Ufficio Italiano Brevetti e Marchi. Self-elaboration.

Examining individually these three main industrial areas and taking an historical and evolutionary perspective, we see that these local identities find themselves in different stages of development and how they have followed equally different innovative processes (Tab. 4.5).

Measurements at national level show how the wood-furniture sector is in a mature phase of development, characterized by a progressive reduction in patents filed. Since the sector is no longer in an initial phase, it does not direct business strategies towards understanding customers and related needs by investing in product innovations, but rather, although to a decreasing extent, towards procedural innovations (Utterback and Abernathy, 1975).

[6] There are no data after 30th June 2015 as the patents filed at a later date have not yet obtained a concession (due to the very long iter of more than 30 months to obtain the concession).

Tab. 4.5: Patents filed from 1st July 2008 to 30th June 2015[7]

Years	Cluster A/C FVG	District of Verona	District of Brianza	Italy
01/07/2008	15	22	41	181
2009	32	35	76	351
2010	29	27	85	367
2011	24	26	76	351
2012	26	28	79	355
2013	31	41	70	348
2014	30	46	65	339
30/06/2015	-	-	9	59
Total	**187**	**225**	**501**	**2,351**

Source: Database Ufficio Italiano Brevetti e Marchi. Self-elaboration.

At the local level, the Brianza Furniture District follows the general evolutionary trajectory of the national sector, revealing a collapse of patentable deposits by 24% in four years. On the other hand, the Verona Furniture District and the Cluster A/C FVG, after a slowdown in patentability caused by the 2009 crisis and the consequent fall in demand, have registered a continuous and constant innovative growth with the aim to reach and overcome pre-crisis levels. This particularly high degree of innovation within the district areas is made possible by the numerous incremental and radical strategies and initiatives that arise from the relationships established within and outside the local boundaries between the various specialized and interested parties.

By studying the nature of the holders of patented innovations, we can affirm that all these areas of the wood and furniture sector maintain a traditional, manufacturing and industrial footprint. In fact, we observe how the majority of patents (more than 60%) are produced by human resources within companies and only a minimal residual part is instead generated by universities or research bodies. In order to guarantee a certain level of innovation, the traditional districts thus begin to adopt the triple helix model typical of technological clusters, maximizing the role of knowledge creation covered by universities or by various public and private institutions and centers of research, development and training (Etkovitz and Leydesdorff, 2000). Focusing on the clustered reality of Friuli Venezia Giulia, in recent years the Cluster A/C, being aware of the insufficient innovative participation of organizations and institutions, has given rise to new development and

[7] There are no data after 30th June 2015 as the patents filed at a later date have not yet obtained a concession (due to the very long iter of more than 30 months to obtain the concession).

innovation projects, undertaking relations with public institutions such as Confartigianato, Confindustria, Unindustria, Federlegno, Ca' Foscari University of Venice and the Universities of Studies of Trento and Udine.

To sum up, we can conclude by stating that the study of patents has allowed to give empirical evidence that within the district areas the level of innovation activities (propensity to innovate) and the knowledge creation are higher than in other national regions.

4.2.2 Analysis of the knowledge transfer in the Cluster A/C

After demonstrating greater density and innovative propensity within the districts, we proceed with the analysis of the circulation and sharing of knowledge, through the study of the patent citations of the patents produced within the Cluster Arredo/Casa FVG. The purpose of this last experimental phase is, as we have already stated, to represent the progressive characteristic inclination of these areas, and of our cluster, to collaborate, relate and collectively work with the ultimate aim of creating a network that is capable of maximizing and constantly enhance the cognitive flow and the creation of new knowledge and innovation.

Patent citations are required whenever a patent is filed for a given innovation or knowledge (Jaffe, Trajtenberg and Henderson, 1992; Hall, Jaffe and Trajtenberg, 2001). In this way, they recall the previous knowledge that was used in the production of new knowledge, thus representing a proof of transfer and absorption. Such prior knowledge can be manifested as patents in the case of private knowledge and as literature in the case of public knowledge (Hall, Jaffe and Trajtenberg, 2001).

Citations thus trace the flows of knowledge that are created through the networks of relationships between inventors, companies and institutional bodies, giving rise to synergies, cognitive spillovers, new inventions and therefore innovations (Jaffe, Trajtenberg and Henderson, 1992).

In order to examine the patent citations, we used the database of the European Patent Office (EPO), as, unlike the UIBM database, it contains detailed information regarding citations and previous knowledge.

The study of the 187 deposited patents from 2008 to 2015 in the area of the Cluster A/C FVG allows us to analyze the historical evolution of the 791 citations and therefore also of the relationships that are created inside and outside the local zone. From a first and superficial reading, we note a prevalence of foreign citations (in particular linked to patents belonging to the same sector, mainly of German, US, French and English origin) and of citations related to the basic scientific literature. Only in recent years citations of patents produced within or outside the borders are increasing, in particular thanks to the new innovative relational vocation of the cluster (Tab. 4.6).

Focusing instead on the historical trend and paying even more attention, we see how the Cluster A/C has implemented over the years strategies aimed at strengthening intra and extra-district relations, contributing to a progressive transfer of knowledge. While the citations to scientific literature have experienced a downsizing and an evolutionary slowdown, the citations of patents produced inside and outside the local area (therefore representing intra and extra-district relations) and in particular those related to previous foreign knowledge record a positive and growing trend, demonstrating a progressive commitment to innovate and share new skills and know-how (Tab. 4.7).

Tab. 4.6: Composition of patents and relative patent citations from 1st July 2008 to 2014[8]

Years	Nr. Patents	Nr. Citations	Nr. Patent Citations	Nr. Patents Citations			Nr. Scientific Literature Citations
				Abroad	Intra-District	Extra-District	
01/07/2008	15	50	34	28	2	4	16
2009	32	127	92	78	4	10	35
2010	29	121	89	75	4	10	32
2011	24	93	68	56	5	7	25
2012	26	108	79	64	6	9	29
2013	31	145	107	87	8	12	38
2014	30	147	112	89	9	14	35
Totale	**187**	**791**	**581**	**477**	**38**	**66**	**210**

Source: Database European Patent Office. Self-elaboration.

[8] There are no post-2014 data since in the first semester of 2015 no patents were filed in this territory and above all because the patents filed after 30th June 2015 have not yet obtained a concession (due to the very long iter of more than 30 months to obtain the concession).

Tab. 4.7: Trend of patent citations from 1st July 2008 to 2014[9]

Years	Var. % Nr. Citations	Var. % Nr. Patent Citations	Var. % Nr. Patents Citations			Var. % Nr. Scientific Literature Citations
			Abroad	Intra-District	Extra-District	
01/07/2008	-	-	-	-	-	-
2009	+19.06%	+26.84%	+30.58%	-6.25%	+17.19%	+2.54%
2010	+5.13%	+6.75%	+6.10%	+10.34%	+10.34%	+0.89%
2011	-7.13%	-7.68%	-9.78%	+51.04%	-15.42%	-5.60%
2012	+7.20%	+7.24%	+5.49%	+10.77%	+18.68%	+7.08%
2013	+12.60%	+13.60%	+14.01%	+11.83%	+11.83%	+9.90%
2014	+4.76%	+8.16%	+5.71%	+16.25%	+20.56%	-4.82%

Source: Database European Patent Office. Self-elaboration.

As already discussed in the previous chapters, the transfer of knowledge takes place mainly through the implementation of three processes, namely the direct imitative observations, the intra-company relations in the district sphere and the labour force mobility created between the localized companies.

While the first two processes can be quite effectively represented by the citations contained within the patents, the third mechanism is difficult to measure as human resources operate in this case as knowledge carriers between two companies or district organizations. The mobility of the workforce thus creates new collaborations with other subjects inside or outside the local area, giving rise to a network of direct and indirect relationships, capable of nourishing the circulation of knowledge.

Relations of direct nature consist of patents born from the collaboration of two or more inventors, while the indirect ones arise through cooperation that took place before patented invention. For example, an indirect channel is created when inventor A, which has patented with B, indirectly comes into contact with inventor C, who had previously patented another invention with B. In this way, the relationships that are created are capable of creating development and new knowledge (Hall, Jaffe and Trajtenberg, 2001).

Taking up the analysis carried out and assuming these latter statements we therefore note some limitations. First of all, the choice of these categories of the UIBM database may have unconsciously included even inventions not directly related to the wood-furniture sector. Furthermore, patents can be considered as an approximation and not as a precise

[9] There are no post-2014 data since in the first semester of 2015 no patents were filed in this territory and above all because the patents filed after 30th June 2015 have not yet obtained a concession (due to the very long iter of more than 30 months to obtain the concession).

measurement of the innovation activities, since the quantity of these outputs does not always match the quantity of inventions actually generated. Moreover, the patent citations can often be linked to simple references and not to real flows of knowledge, not offering an effective representation of the sharing of know-how. Finally, as we have said, part of the innovations is originated by the mobility of human resources and from inventors who act as knowledge carriers, in particular through indirect channels, and for this reason they do not appear as knowledge flows despite representing a form of transfer, albeit difficult to code (Jaffe, Trajtenberg and Henderson, 1992).

In conclusion, despite the presence of these limits, the empirical study conducted in this area confirms the theories of knowledge transfer.
First of all, we have demonstrated the greater density of entrepreneurial realities, mainly small and medium-sized, within district areas. In addition, an high level of innovation (represented by the patents filed) and an inclination to knowledge transfer are recorded and confirmed within these areas. Finally, this propensity to transfer, made possible by direct imitative observations, intra-company relations (both assessed by patent citations) and by the labour force mobility through direct and indirect relationships, is constantly increasing, exploiting the networks of intra/extra-district and in particular foreign relations, indicating a progressive devotion to innovate and share knowledge.

4.3 Cluster Arredo/Casa FVG as network knowledge integrator

As previously stated, the Italian economic and industrial fabric is composed mostly of SMEs, including almost all of the employment. This business composition of the Italian system does not contribute to the entry of investments aimed at enhancing the domestic demand, the production of Made in Italy and the international competitive advantage deriving from knowledge and innovation.
In order to facilitate innovative mechanisms, the forms of aggregation must focus on training and research activities, contributing to the transfer of knowledge, in particular tacit, as the main source for innovation and enhancement of businesses and the local area itself. We therefore need an organizational reform at the global level of the production chains, focusing attention on the capacity of transfer, absorption, creation of knowledge and on which processes to implement in order to obtain cognitive progress (Buciuni and Finotto, 2016).

Knowledge integrators and network knowledge integrators come into play, acting as professional figures who will deal with the transfer and creation of tacit knowledge following the SECI model presented in the previous chapter. They represent the keystone for the development and progress of the local area concerned.

4.3.1 Knowledge integrators in Italy

Global competition is increasingly threatening local districts and forms of aggregation such as clusters. They are no longer able to survive by making a luxury production based on innovation, but they must be able to assimilate new knowledge, mostly tacit, by relating it to the final markets (Pisano and Shih, 2012).

Currently, it is easily ascertainable that this international projection has influenced the survival of the districts, conditioning their performances in a different way and entity between them.

Suffice it to say that, within the same sector, different forms of aggregation may have implemented different strategic internationalization policies. For example, in the footwear sector, the Montebelluna District has adopted a delocalization to eastern countries, fragmenting research and productive development, drastically reducing local manufacturing employment, albeit attracting investments from major international brands. On the contrary, the survival of the Riviera del Brenta District, dedicated to the production of luxury footwear, has maintained a local and internal manufacture, attracting huge investments of many world leaders in the sector, such as Armani, Prada and Louis Vuitton. These different strategies can be explained by a different range of competencies held by the two districts, such as the production of sports shoes in the first one and the production of luxury shoes reflecting the value of Made in Italy in the second one.

Numerous studies base their thought believing that the best solution is to maintain an internal production, integrating local knowledge with the foreign and global sphere thanks to the interventions of leading companies, strengthening the competitiveness of the whole territory.

Another example, even more striking, is the difference between the two districts that are protagonists of the furnishing sector in Italy, the Italian Chair District (Chair District of Manzano) and the Furniture District of Livenza.

The first one, which for years has been the world production center of chairs, has implemented a manufacturing delocalization, reducing employment by 44% in just six

years. The second one, located few kilometers away from the district of Manzano, to address the economic crisis, tried to enhance internal production promoting its high level of specialization based on the quality and design Made in Italy. As result, it recorded a considerable increase in turnover, also contributed by the arrival of investments and supply agreements from giants such as Ikea.

As announced in the previous chapter, the district and clustered realities need innovative competitive models in order to survive in this new international economic system. The Italian production chain, summarized in the Made in Italy, structures its future on innovative and economic drivers called network knowledge integrators, capable of integrating international resources with local specialization.

In this economic scenario, in which different competitive internationalization strategies are manifested, mainly characterized by a delocalisation of production, the main idea is to start focusing on the strategic control of production as strength of the Italian production system (Buciuni and Finotto, 2016). Direct control in the international final markets must also be supported, parallelly to the enhancement of the manufacturing preside, integrating the two dimensions, to ensure innovative internationalization development.

According to the professor and researcher Giulio Buciuni, the Italian manufacturing and industrial system urgently needs a dynamic and radical innovative development orientation, moving from attachment to the small artisan dimension, to new organizations related to the global ecosystem, adopting innovation mechanisms that exploit channels for direct control of international chains and markets.

Knowledge integrators, acting as a link with the global reality, form fundamental network economies for their mission, offering stability, continuity and innovative relationships.

Currently, the Italian system is characterized by SMEs not yet in possession of resources and competencies required by global competition. The role of network knowledge integrators is therefore crucial, integrating resources and know-how in order to penetrate and supervise international markets (Giuliani, 2007).

In this way, the leading companies act as cognitive junctions between the local productive reality of small and medium enterprises and the internationalized reality.

The combination of local production and global direct control guarantees a first competitive advantage for the district (Buciuni and Pisano, 2018), offering innovations also to local small and medium-sized enterprises that still maintain a certain distance and protection from international competitive threats (Belussi and Sedita, 2009).

Regarding knowledge integrators, a classic example is the Associazione dei Calzaturifici della Riviera del Brenta (ACRIB), relating local producers with global markets and partners. Network knowledge integrators, on the other hand, find an example in the Cluster Arredo/Casa of Friuli Venezia Giulia, representing a network of companies (through the establishment of a consortium company) that promote the dissemination of knowledge and innovative internationalization. In this way, a direct entry is offered in the target markets of the companies belonging to the cluster, thus enhancing the Made in Italy.

Focusing on the first type, the mere integrators of knowledge, we are going to analyze the most representative example, the so-called Associazione dei Calzaturifici della Riviera del Brenta (ACRIB), characterized by a stable industrial and production level even during the economic crisis of 2008-2009, partly guaranteed by huge investments of leading and global companies, able to cope with global competition.

This district is quite unique, especially compared to the other districts of the sector, almost all of which are in decline, as it has managed to transform itself into the world footwear manufacturing hub, attracting continuous foreign investments. Its renovation was guaranteed by evolutionary processes of companies and institutions such as the ACRIB. These strategies have changed these entities into knowledge integrators, thus relating to global realities, internalising cognitive and innovative resources in the local area, constantly enhancing skills and competencies.

This is how new relationships are born with leading companies in the global sector, through supplies, partnerships, direct investments in the local area by global brands or through the direct entry of local companies into the global sector. As result, this progressive internationalization has allowed the district to become the production center of luxury footwear in the global ecosystem.

The ACRIB integrates local production competencies with international knowledge and innovations, allowing internationalization even to small and medium-sized enterprises that do not own the qualities to autonomously internalize the knowledge outside the district jurisdiction and in particular the global knowledge.

This integration is guaranteed by paying attention to education, receiving support from training institutes such as universities, schools and research institutions, offering international knowledge, skills and processual and product development (Belussi and Pilotti, 2002).

For these reasons, the Association presents itself as an organizational structure with absorptive capacity for knowledge, capable of integrating it, resulting in a model for the different institutions in the various districts of the Italian manufacturing fabric.

4.3.2 The origin of knowledge integrators in Friuli Venezia Giulia

The studies of Buciuni and Pisano show how the maintenance of a production on site, linked to the competencies of circulation and assimilation of knowledge, are among the competitive factors for the survival of Italian districts or clusters in a landscape deeply conditioned by internationalization and globalization.

The research carried out by the two professors and researchers focuses on understanding the two districts belonging to the Cluster A/C. In particular, aspects related to internal production and to a specific geographical proximity are observed, focusing on the way they contribute to the success of this form of local aggregation.

The choice of these two districts has been forced by the fact that both are located in one of the most productive and industrialized areas of the country and of Europe, where local lead firms are connected with the main highly specialized and global internal players, and where knowledge is the basis of progress and innovation. Furthermore, the two districts are in competition within the same sector, and for this reason they are more easily comparable, as they hold similar factors regarding wages, labour and sectorial industrial and economic policies (Lombardi, 2013).

Following again the research of Buciuni and Pisano, they focus on factors that reflect the evolution of the districts, such as the size of the population of companies and the workforce within it. In this way it is possible to highlight the aspects of strategic and operational orientations capable of supporting an international progress and projection of the production and supply chain (Pisano and Shih, 2012).

Subsequently, objective aspects were analyzed, such as the turnover of each company, data on exports, production units, the number of employees and any important foreign direct investments, with the aim of determining the effects of strategic plans. In this phase, we observe the process and product development and innovation projects. In particular, we focus on the coordination of relationships with suppliers and other eventual internal and external actors, on the product development mechanisms and on the achievement of global markets (Lombardi, 2013).

Due to the lack of information on the district in the period before 2005 and after 2014, the analysis was carried out taking into consideration the ISTAT data in this precise period.

As previously announced, the Manzano Chair District was not able to implement reorganization mechanisms in order to compete within the new global scenario.

Born around the end of the nineteenth century, it owes its first expansion to its proximity to critical production sources, in particular highly qualitative raw materials that are easily available to use in production. Thanks to the period of economic progress that characterized the national territory during the second half of the twentieth century, the district manufacturing area has evolved thanks to a progressive productive specialization and to the beginning of a first phase of sectoral internationalization. At the end of the century, the Manzano District was the producer of over 35% of the world supply of chairs.

At the beginning of the new millennium, conditioned by the new globalized scenario, the number of the workforce has more than halved over the course of a decade, also reducing the population of companies within the area by 44% and causing a drastic fall in manufacturing which halved over the course of twenty years.

The District of Livenza, born parallel to that of Manzano, and located about 50 kilometers from the latter, followed an evolutionary trajectory very similar to its nearest district, differing however in this last period thanks to its ability to adapt to the global and internationalization conditions.

This ability has allowed him to survive globalization, suffering only from a tenth employment drop and an almost 20% decrease in the company population.

This adaptation was guaranteed and made possible by a reorganization of the production and supply chain in a global perspective, becoming a new production hub capable of attracting the interest of multinational giants in the sector such as Ikea and Leroy Merlin.

This organizational reform was guaranteed by the leading companies located inside, capable of supporting economic development by establishing relationships with multinationals and/or institutions aimed at innovation and progress (Giuliani, 2005). In this way the local specialization was connected to the requirements and requests of companies such as Ikea and Leroy Merlin, satisfying on the one hand the foreign market and on the other hand generating new knowledge within the local area.

The district's leading firms, including Friul Intagli and Media Profili, have heavily invested in upgrading the production chain, becoming suppliers of an international market

thanks to the investments of multinational companies attracted by the conditions and competitive factors of this manufacturing territory (Giuliani, 2007). In this way, by projecting the supply chain towards globalization, relations have been generated with the external and foreign environment capable of transferring new knowledge.

The knowledge that can be transferred and generated in this international reform of productive, logistic and operational aspects, concerns new manufacturing, industrial, processual, product, management and distribution capacities, with the aim of raising internal specialization and satisfying the needs of foreign target markets by establishing direct access and channels. These direct relationships with the external and international environment did not occur in the Manzano Chair District, causing an evolutionary and productive block of this district model (Buciuni and Pisano, 2018).

In the industrial area of Manzano, already conditioned by the leading companies that are not able to assume quite significant dimensions, exports and relations with the global dimension take place through loose unstructured indirect channels that do not allow to exploit innovative sources of knowledge crucial for the evolutionary cycle and for international competitiveness. The knowledge of the production and the knowledge of the market within this district are strictly local, hindering the innovative progress and pushing global players to look for new producers and suppliers at low cost.

Tab. 4.8: The evolution of Districts of Manzano and Livenza

Cluster	Chair District of Manzano	Furniture District of Livenza
Location	Friuli Venezia Giulia – Province of Udine	Friuli Venezia Giulia – Province of Pordenone
Establishment	1890s	1900s
Lead Firms	Calligaris, Krassevig, Potocco, Palma, Tonon	Friul Intagli, Media Profili, Valcucine, Sangiacomo
Production units (2005)	888	846
Production units (2009)	675 (-24%)	813 (-4%)
Production units (2015)[10]	501 (-44%)	693(-18%)
Employees (2005)	8,076	17,336
Employees (2009)	5,564 (-31%)	18,760 (+8%)
Employees (2015)[11]	3,818 (-52%)	14,995 (-13%)

Source: Buciuni G. (2016), *Surviving Globalization: Resilience and Recombinative Capacity in Northeast Italy*, Trinity College Dublin.

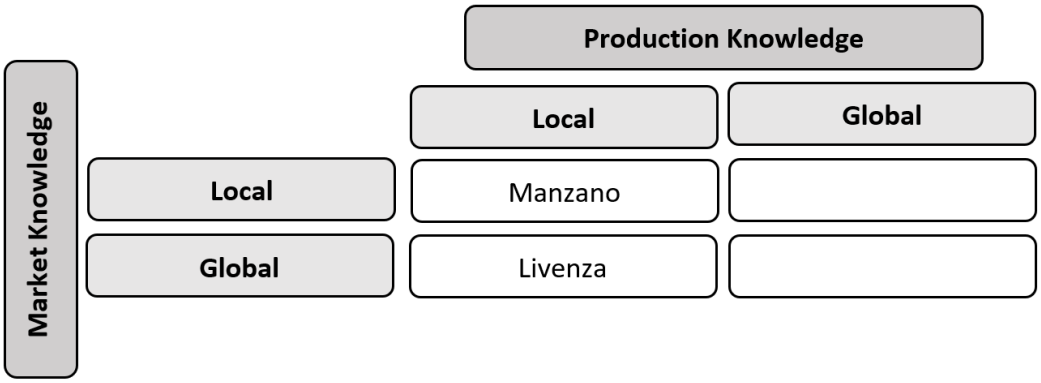
[10] [11] After 2015 there are no data available concerning the two Districts since in 2015 Cluster Arredo/Casa FVG was established, in compliance with regional law 3/2015, as a "joint" representation of the Manzano Chair District and Livenza Furniture District.

Taking up the ability of the Livenza Furniture District in adapting and surviving to globalization, one of the strengths for success was the attachment of production to the local sphere, based on a qualitatively high level of specialization, with a modest use of technology but with an high workforce.

This manufacture was supported by investments of leading companies in maintaining and improving the district's basic knowledge, contributing to the improvement of the technical and industrial competencies of local SMEs, thus reaching the demands and needs of the global market (Buciuni and Finotto, 2016). In addition, lead firms have been able to create and maintain structured and systematic relationships through direct access with the main international players, creating a transfer, absorption, internalisation and creation of new knowledge and innovation. In this way, the knowledge internalized by leading companies is then transferred and absorbed also by SMEs that do not possess the competencies and requirements to independently assimilate knowledge, thus creating a mechanism and a local learning society.

In summary, the district implements an organization that would allow to integrate a knowledge of local production with a global market knowledge, guaranteed in particular by production and product innovations.

Fig. 4.11: Production and market knowledge in the Manzano and Livenza Districts



Source: Buciuni G. (2016), *Surviving Globalization: Resilience and Recombinative Capacity in Northeast Italy*, Trinity College Dublin.

The ability of the district to relate the local basic knowledge and the knowledge deriving from the global environment must be strictly cohesive and combined with the presence of knowledge entities within the area, which acts as an effective and continuous integrator of knowledge and supports the network of relationships between local and global knowledge.

In this district, the types of innovation that are mainly originated by the intervention of knowledge integrators concern the processual, strategical and industrial development (Pisano and Shih, 2009). In this way, the competitive advantage is thus given by an highly productive and specialized supply chain (Hannigan, Cano-Kollmann and Mudambi, 2015).

Knowledge integrators, effectively fulfilling their tasks, are able to develop knowledge that will later be absorbed and implemented not only by leading companies such as Friul Intagli and Media Profili, but even by SMEs, contributing to the development of the whole district through progress in technological, manufacturing and industrial capabilities.

4.3.3 Cluster A/C FVG as network knowledge integrator

Having previously described the institutions operating as knowledge integrators, we proceed to analyze networks of companies operating as network knowledge integrators, such as the Cluster A/C. Introducing the concept of knowledge integrators, we define those organizations that operate between the global market and a local entrepreneurial ecosystem, such as an industrial district.

The Cluster Arredo/Casa FVG, intended as Innovation Pole and private consortium company with limited responsibility, is an excellent example of a network knowledge integrator, appearing as the source of internationalization and development, through the coordination of 10 business networks involving 70 companies, operating on 16 international markets, structured in commercial operations and direct control.

Despite its recent origins, this Cluster effectively succeeds in combining locally internal strategic and internationalization competencies, best representing the concept of integrator introduced by Buciuni and Pisano through research conducted in this actual area (Buciuni and Pisano, 2018).

The Cluster A/C FVG, operating as a link between companies and institutional bodies, in a territory characterized by the two most important districts of the home furnishing system, plays a fundamental internationalization role.

In the new scenario, particular attention is paid to small and medium-sized enterprises, focusing on the creation of direct control in global markets, seeking to seize competitive

needs and factors at international level, giving rise to a succession of network knowledge integrators.

There have been numerous initiatives and strategies implemented by the cluster in recent years. First of all, its role as a network knowledge integrator allowed the introduction of six certifications, of which three related to the product and three related to management systems.

This last type of certification includes:

- ISO 9001: certification attentive to the management of the organizational and procedural structure, with the aim of improving the efficiency, quality and effectiveness of the production cycle; involving management, design, sales and procurement, production, provision of services and any after-sale services such as checks and assistance;
- ISO 14001: certification dedicated to the reproduction of an environmental management system, based on a cyclical development mechanism consisting on the implementation of four cyclical phases: planning, implementation, verification and action. This certification is responsible for investments in the fields of control and improvement in environmental and regulatory compliance;
- ISO 45001: certification of management system aimed at safeguarding health and safety at work for all the professionals within the cluster and the companies participating in it.

On the other hand, the three product certifications introduced by the cluster are:

- FSC Certification (Forest Stewardship Council): international certification issued by the homonymous NGO, dedicated to the achievement of industrial, production, environmental and social requirements in compliance with standards relating to the management of forest resources in a responsible manner;
- PEFC certification (Program for Endorsement of Forest Certification schemes): independent certification of sustainable forest management alternative to FSC certification. Through qualitative and quantitative measurements, it sets forest management criteria and indicators, increasing the competencies related to ecological and sustainable land management;
- CAM Certification (Minimum Environmental Criteria): certification for environmental management dedicated to sustainable and eco-friendlier production,

which involves innovation and sustainable technologies satisfying the new demands of markets and public government institutions.

Parallel to the release of the certifications, which increased by 30% in the two-year period between 2015 and 2017, this new network knowledge integrator carries out activities of support and coordination of the business networks created during the evolution of the Cluster Arredo/Casa.

Among the main business networks managed by the Cluster, Italy for Contract (IFC) and Make My Design (MMD) stand out.

The first is an organization of companies geographically located in the local and near area, with the aim of creating new channels that allow to penetrate new emerging and developing markets. This initiative is primarily characterized by specialized companies that have a particular interest in forming a complementary production and commercial network, implementing a common internationalization strategy, aimed at the exchange of knowledge and direct control of the markets, with the supervision, management and coordination of the furniture cluster.

IFC partly allows to achieve a joint reduction of fixed costs, a sharing of subjects and knowledge, also seeking international partners that allow a stable control of the target markets. In other words, the organization allows the formation of the network and the coordination of international commercial relations, thus acting as a network integrator.

The role of the Cluster A/C (as consortium company) in the training of the network knowledge integrator is of fundamental importance, since its stock knowledge is vital in the selection of companies and institutions compatible in terms of production, culture and trade, and for this it must be integrated into the international perspective. In this way, we note that the integration between local and international features is still present, extremely important for knowledge integrators in internationalization processes.

The second initiative, Make My Design (MMD), also maintains an union between local aggregation and international supervision, implementing a relationship between local production and an offer addressed to designers, companies and international clients in the home furnishings sector.

Similar to the ACRIB, relations between producers and counterparts are facilitated through institutions that act as a connection between needs, global knowledge, inputs and local skills. Similar to IFC, on the other hand, this initiative has a base of specialized companies that have a particular interest in forming a vertical production network,

implementing a common commercial internationalization strategy, with the supervision, management and coordination of the cluster.

Among the other business networks created since 2015 we find the network Italian Chair District For International Markets, which focuses on the revaluation of Made in Italy and on the strategy of direct channels that allow the stable achievement of foreign and international markets, mainly in territories located in the Middle East, through partnerships, B2B relationships, alliances and exhibitions that allow an exchange of information and innovative knowledge.

In this context, it becomes strictly critical the implementation and management of additional networks, interested in the creation of production projects concerning the contract-furnishing sector (Tailor Made Contract), the exchange of innovative knowledge and know-how addressed to international markets in the field of solidity, consistency, utility and charm (ASquadra) and to high quality production and refined design (The Italian Concept).

In this context, the ecosystem that is created is nothing more than a center where local and global knowledge, competencies and innovations are integrated.

4.3.4 The management of Cluster A/C FVG as network knowledge integrator

As described in the previous chapter, the training of network knowledge integrators, and in particular of the network knowledge integrator of the Cluster Arredo/Casa FVG, is given by a selection of compatible companies, by the analysis of the specializations of such companies followed by the preparation of an integrated offer, by the elaboration of a common strategy and by the implementation of an operational plan.

In this way, estimates and comparative analyses are implemented on the capacity, tendency and propensity of companies and their professional figures to innovate. By studying the environment, the propensity and also the level of innovation reached by individual companies, the cluster, investing in innovative processes, is able to consolidate the propensity to innovate. Then, it strengthens collaborative and cooperative relationships between companies and the various institutions involved such as research and development centers, universities and institutions dedicated to training.

The business aggregation and the different actors related to it are managed and coordinated by a cluster manager (Pisano and Shih, 2012; Buciuni and Pisano, 2018). It

is a new professional figure capable of integrating the knowledge of specialized local small and medium enterprises with competencies and resources oriented towards internationalization processes.

The studies of Buciuni and Pisano reveal how the figure of the cluster manager, a figure without preferential relations but nonetheless endowed with an high level of specialization, is covered by the cluster itself, understood as a supra-district organization and consortium company.

The Cluster A/C FVG thus represents a legal consortium entity that holds a fair degree of trust between local companies, avoiding preferences and enjoying an high level of sectorial specialization. In this way, by investing in the training of these figures and resources, we are able to combine local productive knowledge, supporting the development of the companies, of the cluster itself as well as the production chain of Made in Italy.

According to the careful analysis conducted by the two researchers, for the Cluster Arredo/Casa the focal point in order to integrate local knowledge with the know-how of the global market is the implementation of a penetration process exploiting complementary competencies of companies able to effectively satisfy the needs of global partners (Giuliani, 2005).

These processes and initiatives, directly involving the companies in a complementary way based on their will and possibilities, take on a bottom-up form, integrating the international and global orientation with the cognitive specialization of the furniture sector.

The cluster, acting as a network integrator of knowledge, uses a figure to draw up a disciplinary report for aggregate achievements, responsible for innovation and certification, and a figure dedicated to pursuing these initiatives of internationalization. These figures, to which the residual human resources are subordinate, are flanked by the cluster manager, responsible for the coordination and maintenance of the group of companies being equipped with technical, productive, commercial, relational and international skills and competences.

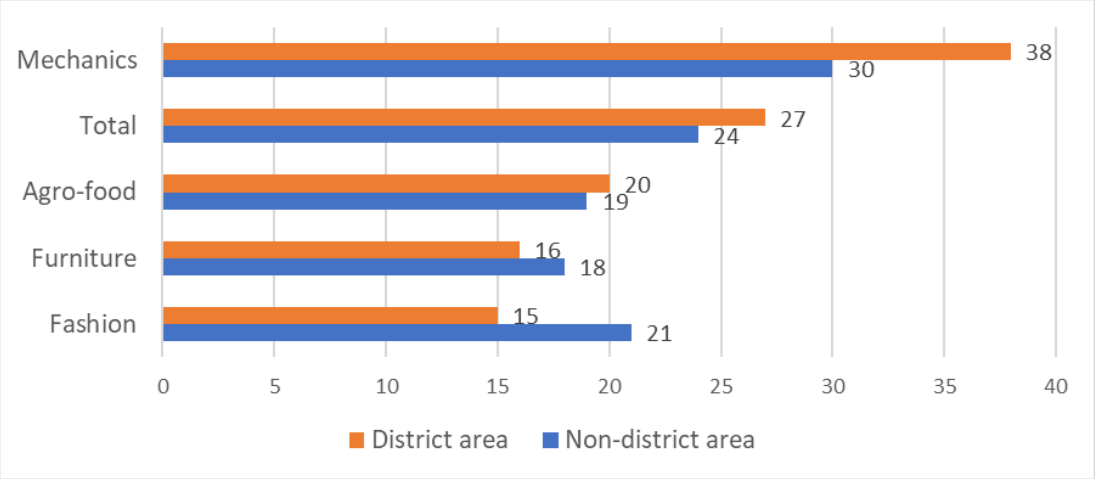
The cluster must be able to revitalize the production and fragmentation of the local workforce by absorbing new know-how and integrating it with the stock knowledge of the clustered area. For this reason, it is very important to continue to permanently preside the final markets, drawing on new sources of mostly tacit knowledge, through direct channels that give life to inter-company and transnational relations.

Local institutions were fundamental for the survival of the cluster and for its function as a network knowledge integrator. First and foremost, we must emphasize the constant collaboration with the Friuli Venezia Giulia Region, responsible for the standardization and definition of the future and global innovative challenges of the cluster, and above all for the financing that made it possible to implement and coordinate internationalization networks (Pisano and Shih, 2012).

Among the relevant challenges of the cluster in the medium term, there is a need for innovators of the home system sector, such as an enhancement of innovative services offered to companies and a constant strategic need for aggregate and complementary operations aimed at directly attending global markets allowing international survival (Buciuni and Pisano, 2018).

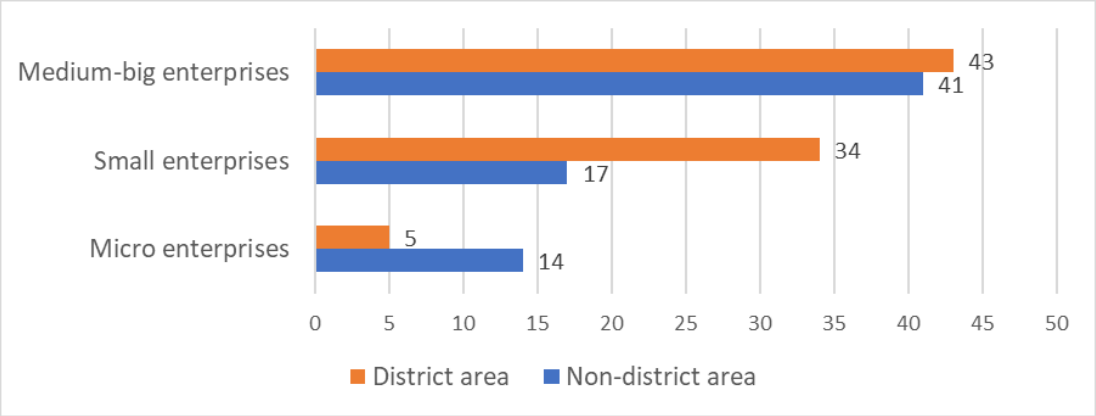
Among the drivers of competitive success at the international level of the cluster there is the implementation of technologies belonging to the fourth industrial revolution. The structural and organizational reform of companies and networks, implied by the use of 4.0 technologies and managed by the cluster in the form of a network knowledge integrator and innovation hub, within a collaborative ecosystem, is increasingly offering both process and product innovations (Mulgan, 2017). Maintaining a purely clustered and district composition, the vast presence of SMEs does not facilitate the achievement of the requisites necessary to implement new technologies, hindering the adoption of new high-tech innovations (Fig. 4.12; Fig. 4.13).

Fig. 4.12: Number of companies using 4.0 technology in the Italian market by macro-sector in 2018



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

Fig. 4.13: Number of companies that use 4.0 technology in the mobile-furniture sector by size in 2018



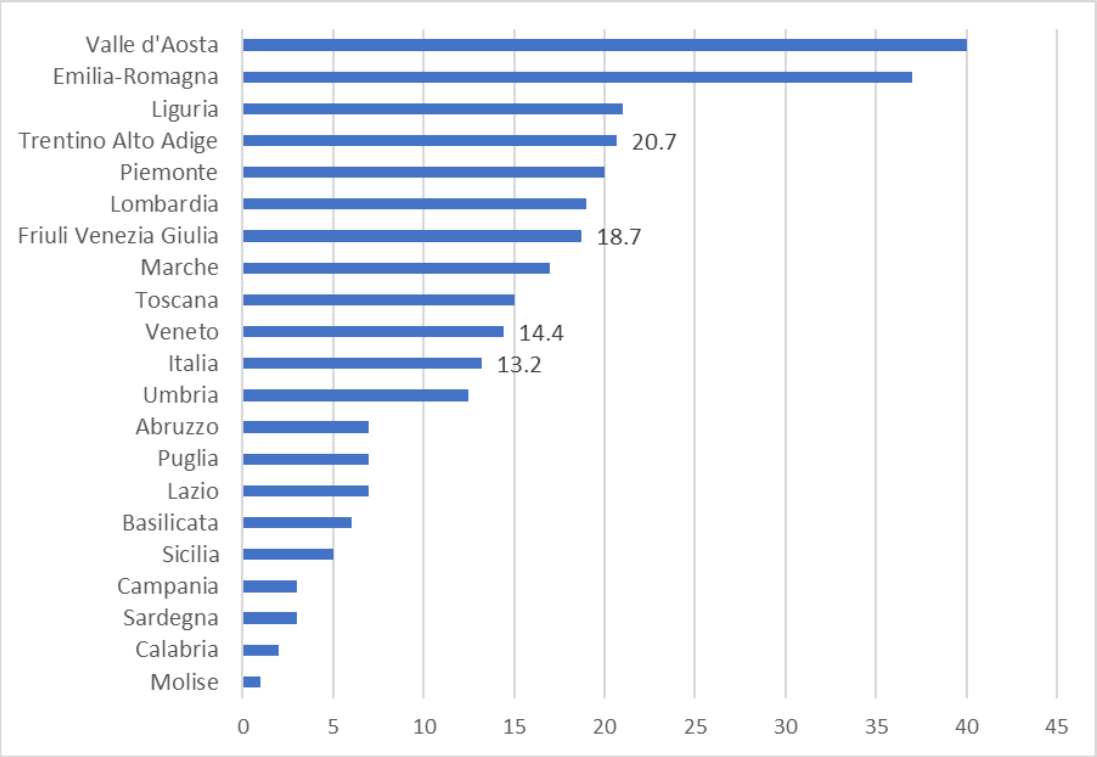
Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

The priority of the cluster is to pursue innovative paths, which pay attention to the research, the exchange of knowledge and the integrated development of products and processes. An attempt is made to implement a structural reform, thus going to affect the productive, organizational, management and control mechanisms, giving an orientation towards innovation, digitalization, exploitation of technologies in a manufacturing and environmental sustainability perspective, through the implementation of infrastructures (mainly ITC type) (Mulgan, 2017).

This last theme, the sustainability, is increasingly gaining importance in the global context and in particular in the furniture sector, due to the enormous quantities of raw materials and semi-finished products required by the production chain.

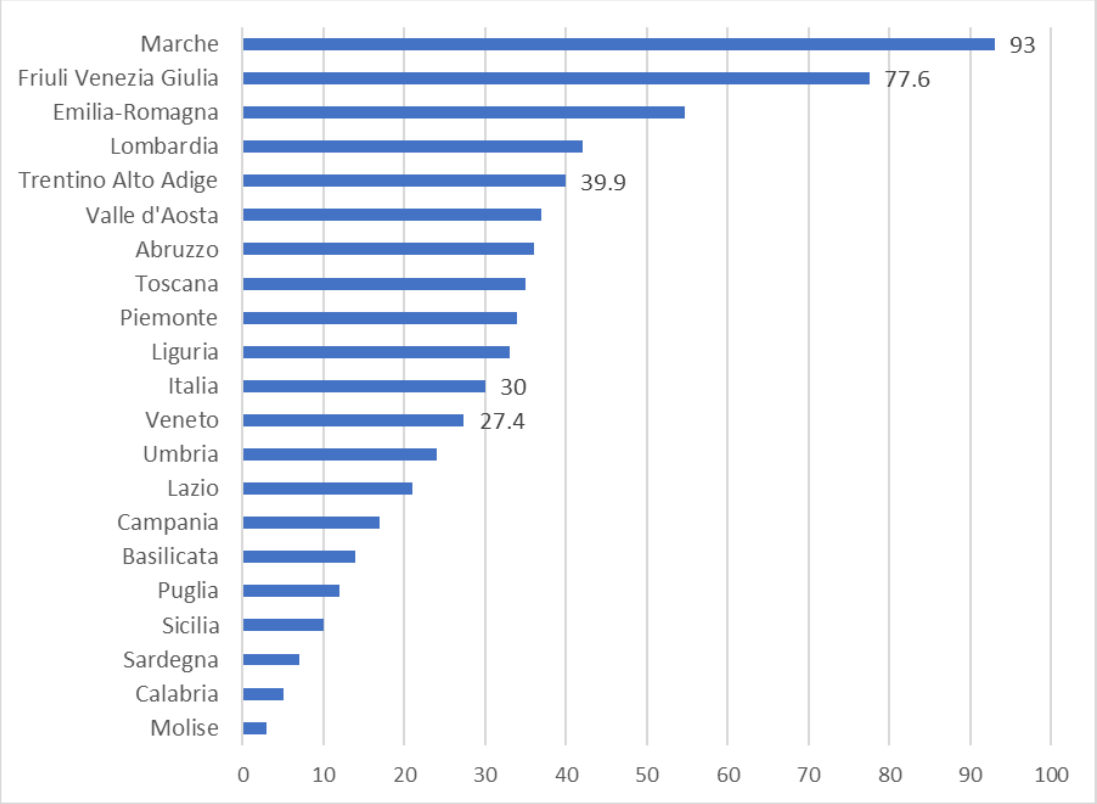
In Italy the furniture industry annually produces 4.5 million tons of wood waste (compared to the total 55 million produced in Europe), thus positioning itself below the average. This efficiency in the sustainable collection of waste is produced in particular from northern Italy, more specifically in the Triveneto (Friuli Venezia Giulia over 65%, Trentino Alto Adige 72% and Veneto 74% of total urban waste), giving to the Friuli Venezia Giulia region the seventh place in the separate collection of wood and the second place for the wood collected and sent for recycling (Fig. 4.14; Fig. 4.15).

Fig. 4.14: Separate collection of urban wood waste in 2018 (kg per capita)



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

Fig. 4.15: Wood collected and sent for recycling in 2018 (tons/1000 inhabitants)



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

The pursuit of these objectives has been supported in recent years by forms of incentive, mainly by the Friuli Venezia Giulia region, with the aim of revitalizing business entities, protecting recruitment levels and spreading development paths.
These incentives represent non-repayable contributions for new recruitments or for the transformation of employment contracts, contributions for start-ups or for the creation of mostly artisan businesses, contributions aimed at encouraging participation in events such as fairs, showrooms and exhibitions in territories outside the clustered area, and subsidies or subsidized funds for technological modernization and regulatory compliance.

Taking up the direct initiatives promoted by the cluster as an innovation hub and knowledge integrator, we introduce two other crucial projects for the promotion and development of the cluster at the international level (Buciuni and Pisano, 2018).
The first relates to the establishment of the company ICIDE (International Center of Italian Design), with the aim of promoting a local productive fabric capable of surviving the current globalized context, pressing on competitive drivers such as Italian design and Made in Italy.
This international plan directed at foreign markets, mainly in Asia, takes on a perspective that is not only commercial and industrial, but also social and cultural. As result, it creates and coordinates effective exchanges of information and innovative knowledge born under a dense network of aggregate reports and consolidated among professional figures located internally and outside the cluster.
The second project, called International Platform, aims to establish a stable, coordinated and lasting link between local companies specialized in Made in Italy and the actors present in the Asian target markets, such as China, Singapore, Vietnam and Russia. This program, through a direct control of these markets representing a global commercial hub for the access point to the entire Asian market, creates a circulation and a diffusion of information and knowledge aimed at the international development of the cluster and of the business realities therein present.
In this way it will be possible to give consistency to an internationalized cluster capable of attracting investments and the attention of global actors able to further increase the value chain.

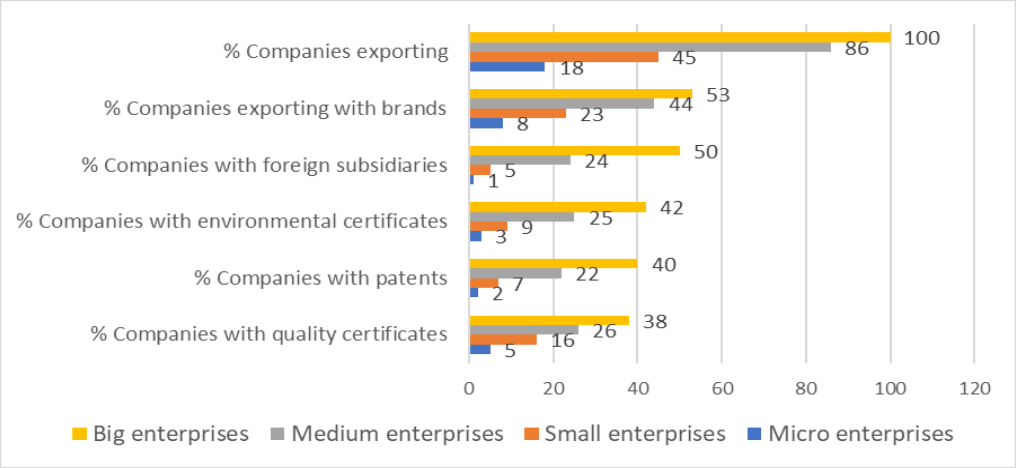
4.4 International development and future challenges

The following paragraph will represent the position gained by the cluster in these years on the global scene, given by the implementation and management of numerous internationalization processes and projects aimed at enhancing the factors that allow it to obtain a competitive advantage in a globalized context.

As already discussed above, the second decade of the eleventh century, already affected by the financial and real estate crisis of 2009, was marked by an exponential phase of globalization that has influenced all national markets, threatening the survival of many local realities. The densely productive territory of the Cluster A/C, already heavily slowed down by the crisis, initially struggled to start the internationalization processes due to the high presence of small and medium-sized businesses strongly linked to domestic demand and not equipped with resources and strategies that would allow a development towards foreign markets.

The entrepreneurial composition and the strategic and operational organization of the area has not favoured internationalization, which has shown a slow recovery in the last five years thanks to the launch of very crucial innovative projects and strategies in order to increase exports (Fig. 4.16). The commitment of the cluster as a consortium entity in promoting the development of the local area has allowed the territory to export goods belonging to the furniture sector for more than € 1.43 billion and wooden products for about € 171 million euros, respectively registering an increase over the previous year by 3.37 and 4.12 percentage points (Tab. 4.9).

Fig. 4.16: Business strategies of the furniture sector by size in 2018 (%)



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

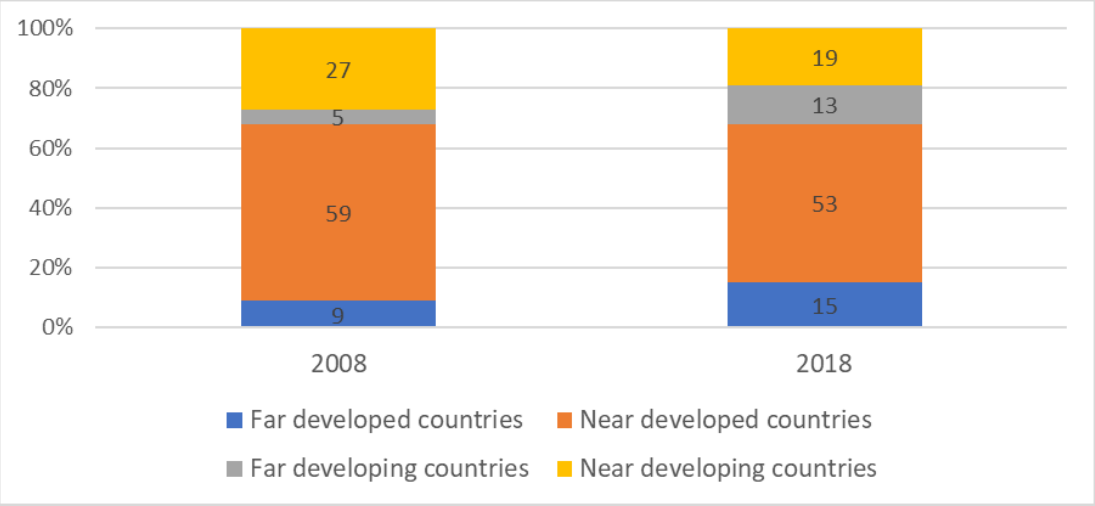
Tab. 4.9: Exports of furniture and wooden products from the Cluster FVG from 2008 to 2018

Years	Furniture		Wood products	
	value	Var. %	value	Var. %
2008	1,515,424,852	-5.78 %	144,373,391	-3.18 %
2009	1,174,644,895	-22.49 %	98,790,085	-31.57 %
2010	1,214,693,924	+3.41 %	127,564,524	+29.13 %
2011	1,261,863,540	+3.88 %	135,126,786	+5.93 %
2012	1,210,715,560	-4.05 %	168,947,393	+25.03 %
2013	1,186,663,967	-1.99 %	143,466,217	-15.08 %
2014	1,242,977,827	+4.75 %	154,946,432	+8.00 %
2015	1,293,666,529	+4.08 %	149,610,055	-3.44 %
2016	1,255,575,739	-2.94 %	150,539,942	+0.62 %
2017	1,379,124,391	+9.84 %	164,239,076	+9.20 %
2018	1,430,672,316	+3.37 %	171,005,725	+4.12 &

Source: Foresti G., Moressa A.M. (2019), *L'industria del mobile tra tradizione e innovazione*, Intesa San Paolo, Direzione studi e ricerche.

The increase in exports in the clustered territory has also led to changes in commercial projections towards new or different end markets. In fact, in this decade we have witnessed a phase, albeit fairly moderate, preferably addressed to the developed and developing markets located at a greater distance than the more neighbouring ones. The data collected testify in fact a decline in exports to near countries of 14% towards more distant markets, to be sought in the desire to expand a network of relationships with long-term accesses in several markets, with the aim of increasing demand, surviving international competition, to innovate and spread the knowledge and the excellence of Made in Italy in the world (Fig. 4.17).

Fig. 4.17: Proportion and composition of exports, 2008 vs 2018 (%)



Source: Database Registered Office Cluster Arredo/Casa and Italian Chair District, San Giovanni al Natisone. Self-elaboration.

Taking up the literary notions of Hidalgo, the increase in the values of the trade balance goes hand in hand with the balance of imagination, as the exported products (strongly based on design and quality Made in Italy) incorporate high levels of knowledge and know-how.

As previously anticipated, this start of internationalization was made possible mainly through the implementation of two projects by the Cluster Arredo/Casa FVG as representative consortium under the role of cluster manager.
The first project involved the establishment of a company owned by the Cluster A/C FVG, called ICIDE, the International Center of Italian Design, created with the aim of commercially developing the territory through internationalization mechanisms in the period between 2015 and 2017. This company, which encompasses 168 participating companies, is aimed primarily at small and medium-sized businesses operating in the area and works in their support during the internationalization processes, seeking to raise productive and commercial capabilities and competences, enhancing the Made in Italy design to global level and exploiting the synergies between the various actors through a network of relationships, business networks and more or less temporary aggregations.
In this way, ICIDE constantly offers specific services both to support companies (giving away 20 initiatives and attending 13 target countries) as well as foreign and international players in the sector with the aim of raising awareness and enhancing local production quality and efficiency.

The period that anticipates the birth of the second project was characterized by new innovative services aimed at innovation which, under a dense network of aggregated and consolidated relationships between professional figures, gave rise to exchanges and disseminations of information and knowledge.
Among the services offered by the cluster we highlight a particular attention in the enhancement of the workforce and in the training of new professional figures, in particular within micro, small and medium enterprises potentially able to valorise the production chain. This consists in services for the development of an environmental management system, for ISO certifications and for a regulatory adaptation of the structures in the theme of environmental impact represented by the Ecolabel certified brand.

Among the innovations offered in the last three years by Cluster Arredo/Casa aimed at creating and managing entry strategies in international markets, there are the development services of European platforms, the assistance to companies on data protection and on new European regulations in force since 2018 on the General Data Protection Regulation, the establishment of a collaborative group dedicated to the coordination of the Cluster A/C and the launch of projects such as Easy-ID for information and production traceability and Greendistrict.it for sustainable issues and for the circular economy.
In order to support the networks of companies and the network of relationships with external actors, the attention is aimed at the production of synergies between different business networks, mostly neighbouring, belonging to different but complementary sectors, as for example the relationship generated with the network of companies Luce in Veneto, purposing to further increase the value of Made in Italy.

The second project, launched in September 2018, consists in the implementation of a strategy called International Platform which, through a network of stable relationships with international players and thanks to a constant gathering of information, know-how and needs of global markets, lends support for Made in Italy companies in the creation of stable and direct contacts in the target markets.
The context in which the International Platform must adapt is given by a global situation characterized by different markets with correspondingly disparate needs and peculiarities and increasingly connected to one another. In addition, the local context, on the other hand, is characterized by a vast presence of SMEs, mostly lacking the structures and capabilities necessary to independently internationalize, due to the huge investments required and the extreme difficulty in internalising and absorbing new knowledge. For this reason, the challenge of the International Platform, which focuses on investments aimed at searching for strategic data and programs aimed at creating direct controls and training new professionals, is to act as a bridge that connects local businesses with the various international subjects.
After a careful analysis of the conditions and characteristics of the possible global target markets, of the actors and channels available to create value and awareness of Made in Italy and of the furniture and home system sector, the project addresses the commercial strategy towards new markets considered attractive and in continuous growth where this sector is exponentially taking hold, such as China, Vietnam, Singapore and Russia.

The Chinese market, without free trade agreements with Italy or the European Union but still interesting thanks to the presence of Free Trade Zones, is characterized by a society with a growing average age, whose two thirds are placed in urban areas. Economic growth and purchasing power, mainly based on production for consumption, are following a growing trend (GDP growth of around 6% compared to 2% of USA in 2018) and are strongly oriented towards innovation and the use of technologies that allow radical and innovative development processes. For this reason, it is essential to learn the competitive drivers of the Chinese market in order to implement long-term relationships.

Concerning the Vietnamese market, first of all it must be emphasized that on June 30, 2019 a FTA was signed with the European Union. As for the Chinese market, we note and expect continued growth of the population with a consequent increase in demand and purchasing power, already fuelled by steady economic growth and by a consequent increase in incomes that cause an expansion of the consumer class.

The third market of interest for the cluster and the International Platform consists of the design city of Singapore. The characteristics that make this city really interesting for the Italian manufacturing furnishing and home system sector are the constant economic growth driven mostly by foreign high-income actors who represent a third of the population and the presence of different ethnic groups that give life to a basket of needs but also of skills and know-how. In addition, other positive aspects are the position that makes the area a link for ASEAN and its propensity to sustainability and innovation in retail, services, accommodation facilities and catering sectors. The top-down approach and the government's presence in design support have led to new investments in infrastructure, innovation and sustainability, giving rise to residential accommodation, hotel projects (80% of Southeast Asia hotel projects are specified in Singapore or from companies with headquarter in Singapore), restaurants and showrooms, whose 80% of buildings will obtain green certifications from the Building Construction Authority by 2030 (currently it is 35%).

The fourth market of interest, even if the purchasing power has fallen by 10% in the last five years, is represented by Russia, a nation in slight recovery and with excellent political, cultural and economic relations with the Italian market. Although there is still a growing polarization between the rich and poor society, almost 75% of population lives in urban areas, whose high-end and middle-high-end consumer are aimed at enhancing the image, quality, design and status. Despite a progressive attention to high quality products and despite the huge government and private investments in the hospitality, real

estate, residential and catering sectors, the Russian domestic lost a third of the furniture producing entities, leaving room for more competitive and mostly international actors. Moreover, the lack of a local production chain in the furniture and home system sector has created gaps in the implementation of a consistent and stable offer and service to the customer.

Given the fact that the investigated markets have important economic and social similarities, the International Platform pursues an identical entry strategy for both destinations.

First of all, the project will try to support the emergence of aggregation forms of companies that are imposed on global markets as unique subjects with greater contractual strength than acting individually. These forms of aggregation must thus create a distribution channel that allows them to access through a direct supervision of the final market, contributing to the creation of distribution platforms and thus relating information, knowledge and know-how of Made in Italy design with the needs and the innovative knowledge of global markets.

In these countries, the first relationships that are established usually take place with prescribers, importing buyers, local retail facilities, international chains, large distributors, and architecture and interior design studios.

The cluster, in order to achieve direct control and a significant presence in global end markets, must focus on products with an high price range, rich in quality and design, involving the use of innovations and technology.

The purpose is to give a representation of Italian manufacturing quality and efficiency. For this reason, it is crucial to set up centers of experience that are not limited to presenting and selling the product, but who are attentive to international standard certifications of interest (such as ISO9001, PEFC, FSC and EAC), services to buyers and specifiers, after sales assistance and maintenance, as well as participation in exhibitions and showrooms.

Therefore, the project must make investments in the training and education of local customers, working on marketing, productive awareness and product not as a mere good but as experience and solution, offering direct distribution to the consumer, aiming at promoting the image of the Made in Italy around the world.

Conclusion

Coming to a conclusion, we saw how the globalization and the internationalization processes of markets and national economies have profoundly changed the economic, commercial, financial and social balances, questioning the survival of many local socio-economic entities. Assuming what was explained in the previous chapters, we can agree that these entities, districts and clusters, are still able to implement those innovative development processes to compete globally and to support local economic development. According to the district context, the competitive advantage derives from a multiplicity of aspects, such as the presence of external or agglomeration economies, a local territorial proximity, a socio-cultural homogeneity, the density of the entrepreneurial population (mainly composed by SMEs) and the collaborative relationships allowing circulation and accumulation of knowledge, know-how and the creation of spillovers. This pool of knowledge, resources and skills guarantees an even higher industrial specialization, allowing to achieve economies of scale or learning economies, lower unit costs and an efficient increase in productivity. In addition, this increase and division of production capacity and the presence of highly qualified professionals guarantee flexibility and a capability to seek adequate production capacities in the district.

Looking at the Italian economic context, we note that the Marshallian industrial district was the backbone of the national economy from the post-war period until the 1990s. This expansion slightly slowed during the 1970s and 1980s due to the change in the international landscape and to the increased competitiveness. The international adaptation achieved in the following decades and continued until today has been guaranteed by different factors, including the increase in integration, quality and production specialization and Made in Italy, which have permitted a diffusion of productive knowledge and a labour division. Added to these elements are the technological factor stimulated by large companies, the increase in foreign investments in particular from multinationals attracted by the competitive drivers of these territories, as well as an increase in foreign direct investments, exports and an expansion of patents in particular thanks to the sharing of knowledge in the end markets. However, although production delocalization is one of the most plausible strategies, districts tend to prefer local production, in order to maintain an effective position within the district area and within the supply chains, exploiting the productive quality level.

These changes led to the evolution of the district up until the birth of the cluster. On the one hand, according to authors such as M. Porter, this definition represents the literal translation of the district concept, while on the other hand, other researchers, including professors R. Huggins and P. Cooke, believe that they are nothing but an evolutionary consequence of the district. According to E. Rullani, clusters can be identified as agglomeration economies, focused on learning, productive specialization and relational extension aimed at the generation and transmission of knowledge and new technologies making the local area extremely attractive for other companies.

Among the main differences between the two forms of aggregation, we note how the district is specialized in labour intensive manufacturing activities, while the cluster favours knowledge and capital intensive sectors. The former is characterized by information flows, inputs and outputs, thanks to territorial proximity and institutions that generate external economies; the latter instead pays attention to the creation of a knowledge society, focusing on productive specialization and the lack of relationships aimed at the diffusion of technology and knowledge. These clustered areas differ from the district ones also due to the level of openness towards the outside, theorized on open innovation concepts. They no longer consider innovation as an in-house process for large companies, but as a resource that can also be exploited by SMEs. This relational openness thus allows to loosen boundaries and to find a more effective implementation of the internationalization strategies. A further difference is the greater propensity of public and private bodies and institutions, such as R&D centers, universities and governments, to actively participate in the networks of relationships in the implementation of a knowledge-based economy, promoting projects, policies, investments, fundings, new knowledge, technology and training of professional figures.

According to the new approach introduced by C.A. Hidalgo, economic development must be analyzed considering economies as an ordered collective ecosystem of complex networks, which act as amplifiers of knowledge and know-how, capable of extending cognitive flows through the reification of information, implementing a chain of knowledge. The main limitations of this collective capacity are the need to create networks of cognitive relationships, the limited capacity to accumulate knowledge of individuals (personbyte) and other factors due to a geographical bias. However, international economic development, supported by the participation of specialized institutions, has allowed the creation of new international networks, mainly assuming a

manufacturing nature capable of transferring knowledge and know-how incorporated in the activities and products. Reconnecting to the theme of the supply chain of knowledge, we believe that this model is able to implement shared development dynamics through synergistic interaction between research, higher education and innovation. The relationships established between the knowledge supply chain and the structural policies thus produce a socio-economic growth, regarding the quality of production and products, the degree of competitiveness and employment.

Assuming these statements, we note that the knowledge resource plays an increasingly important role in order to achieve a lasting competitive advantage. After analyzing the main definitions, characteristics, critical elements, the different degrees of accessibility and the processes of creation, thanks to the literary contributions of K. Polanyi, S. Matusik and C. Hill, we are going to observe the learning processes introduced by D.A. Levinthal, J.C. March and G. Szulanski, the mechanisms of knowledge creation through the model of I. Nonaka and H. Takeuchi and of transfer and reproduction of U. Zander and B. Kogut. The study of transfer and knowledge creation processes shows us how there are differences between the district and the clustered model. With regard to knowledge creation processes, we note that this local resource is easy to share and assimilate in the districts through direct imitative observation, the labour force mobility created between localized companies and intra-company relations. With regards to clusters, on the other hand, the level of knowledge specialization requires a certain prior knowledge and consequent investments in R&D. In processes within the districts, cognitive circulation is fed by local networks, knowledge carrier mobility and imitative observation, whereas in clusters it occurs through the localized network. In addition, the delimited area of the districts makes it difficult to transfer outside the borders, limited only to focal firms, while in clusters such relationships are supported by the open economic nature. These discrepancies in the transfer mechanisms are also reflected in knowledge absorptive models. Within the districts, the absorptive capacity depends on the cognitive proximity deriving from the technological-productive homogeneity of the organizations and from the cognitive closeness deriving from the socio-cultural homogeneity of the subjects and from their ability to relate. On the other hand, within the clusters, due to the articulated and differentiated nature of knowledge, among the critical elements of absorptive capacity there are also the investments in research and development and in human resources, combined with the cognitive proximity and the cognitive interaction typical of the districts, thus facilitating the mechanisms.

Taking up the literary contributions of S. Sloman and P. Fernbach we can see how the ability to create knowledge and innovation does not reside in single people, but rather lies in the ability to create collaborative cognitive relationships allowing to combine and balance individual skills and competences guaranteeing a collective development through a division of cognitive labour. Moreover, the presence of training and education becomes fundamental, aimed at understanding economic development despite the low level of individual knowledge.

Since it is impossible to innovate without learning new knowledge, the attention of the districts therefore focuses on the implementation of a learning-prone society. The birth of these companies focused on the open economy, open source and open innovation, brings learning spillovers and improvements in the skills and competences of companies and workforce, thus optimizing the value chain and the production chain of local area. According to the relevant literature of J.E. Stiglitz and B.C. Greenwald, local companies must try to guarantee better production levels, investments and financial resources for innovative processes, paying attention to the maximization of knowledge and internal information. In this context, policies must manage productive failures and improve learning, producing innovative spillovers and redefining strategies and concepts such as competitive advantage. These economic, macroeconomic, industrial, commercial and financial policies must establish a detailed legal and economic framework, guaranteeing an innovative and social protection system, focused on investments in R&D, reduction of the knowledge gap, education, training and on opening and liberalizing markets.

By expanding their level of openness and enhancing cognitive relationships, through a knowledge-based perspective, the districts are considered as local systems of innovation, as a knowledge lab able to innovate and develop, consequently supporting local economic competitiveness. In this way it follows that those entrepreneurial realities lacking the skills necessary to internationalize will maintain a certain distance from the strong international competition, even if at the same time they will be in any case able to draw on the resources, skills, knowledge and external innovations assimilated by the leading companies. Also in this case, political and institutional support and assistance is crucial in order to manage a cooperative, collaborative and competitive ecosystem.

Finally, the studies of professors G. Buciuni and G. Pisano allowed us to introduce and analyze the theme and functions of knowledge integrators and network knowledge integrators. These organizational structures operate between a local entrepreneurial ecosystem and the global market, being characterized by a strongly manufacturing local

area highly specialized in the various productive activities, by a strategic model of common international expansion and by the managerial control of an organization or institutional body. On the one hand, they promote the innovation of production processes or goods, implementing collaborative activities with local actors and partners, and at the same time, on the other hand, they guarantee direct access to the international and global market, directly investing, implementing partnerships or foreign branches. The establishment of these integrators and "gatekeepers of knowledge" allows SMEs to review their international competitiveness, integrating Made in Italy production capacities and the knowledge of global players, keeping themselves away from international competition.

To sum up, these integrators represent the engine that allows and supports the processes of knowledge creation and circulation in local areas, ensuring their innovative development at global level.

The concluding chapter is useful to give a concrete and real representation of the theoretical concepts concerning the districts and clusters, going to study and analyze the district manufacturing area of the Cluster Arredo/Casa FVG.

The evolutionary study and the characteristics of the two districts located in this area, the Chair District of Manzano and the Furniture District of Livenza, reproduce the literary contributions identifying themselves in the backbone of the sector and of the local and regional economic fabric. Crucial elements as the density of the entrepreneurial population, the level of specialization, industrialization, the presence of highly qualified professional figures, technological and innovative changes and the presence of a dense network of cognitive relationships have determined the survival and competitive success of these territories.

However, the Chair District of Manzano is an example of a district that has not been able to implement a development and innovation process suitable to respond to new global needs. The presence of SMEs without the necessary skills to respond to changes, the low presence of technological innovation and other factors such as the strategic choice to delocalize manufacturing production, drastically decreased the competitiveness, the turnover and the employment level, marking the end of district.

The Livenza Furniture District, on the other hand, in the last twenty years has been able to effectively adapt to international changes, basing their productive activities on the exploitation of those competitive elements that have allowed them to gain a global

advantage. Among these factors we highlight the presence of highly qualified SMEs, the presence of innovative, technological and sustainability processes, and the presence of relational flows of knowledge, information, know-how and skills. In the last twenty years of the twentieth century the district has been able to further evolve while maintaining a certain competitive advantage, driven by productive reorganizations, an increase in the levels of both internal and external demand and in particular by new exchanges of information, knowledge and technologies. Here, the choice to enhance local production peculiarities by maintaining an internal manufacturing presence and to implement internationalization processes aimed at creating direct control channels in the target markets is crucial.

According to the contributions of G. Buciuni and G. Pisano we can agree that within the Furniture District we can find concreteness of the figure of the integrator of knowledge. In this area, in fact, there are elements such as the attachment of production to the specialized local sphere, a productive hub capable of attracting the interest and investments of international economic giants and the presence of networks of relationships. These networks create a connection with the global reality through relationships capable of transferring new resources and knowledge, with the purpose of raising internal specialization and fulfilling the needs of foreign target markets by establishing direct accesses and channels.

Currently, the Italian districts are changing the organizational structure trying to face the new challenges deriving from the innovative processes of internationalization and globalization. The district, understood as the highly and densely specialized ecosystem, is thus represented by a new form of clustered aggregation with the aim of supporting and nurturing the innovative development phase of the territory.

In our case, this new entity introduced by a regional regulation in 2015 is the Cluster Arredo/Casa FVG, representing the Livenza Furniture District and the Manzano Chair District. The cluster is a private consortium company with limited responsibility, which connects companies, organizations, institutions and various highly specialized professionals through a dense network of collaborative relationships, active in innovative development purposing to give an international competitive advantage to local territory. Furthermore, this cluster has the task of extending and improving the strategic supply chain, managing and implementing regional, national or international policies, directives and regulations. As anticipated from the literary notions, it is legally identified in the innovation pole for the development of the cluster itself, enjoying collaborations with

economic multinational colossuses like Ikea and Leroy Merlin able to introduce knowledge and innovations coming from the global context. Thanks to its strategic activities, the cluster has allowed a considerable increase in local productivity, turnover, exports and employment, thus enhancing the economic fabric and the Made in Italy value. This objective was also achieved thanks to the support of new sources of development, such as initiatives, certifications and a constant exchange of knowledge and technological progresses. Furthermore, it has been made possible thanks to the expansion of the networks, involving new actors such as universities and research and training centers, as well as institutional or financing bodies.

The empirical study of the fourth chapter has the task of analyzing the patents produced within the local area, with the aim of confirming a greater inclination to innovation and to the transfer of knowledge within these district realities compared to the rest of the market. In fact, the Cluster A/C area, after a slowdown in patentability caused by the 2009 crisis, has registered a constant innovative growth aiming to reach and exceed pre-crisis levels, thanks to the numerous strategies and initiatives born from the relationships that they have established inside and outside local boundaries.

Focusing instead on the historical trend and on the citations of patents produced inside or outside the area (thus representing intra and extra-district relations), we see how these citations increase from year to year, contributing to a growth in the transfer of knowledge. In addition, observing the origin of these citations, we note how recently the cluster is preferring to strengthen the networks of intra/extra-district and in particular foreign relations, demonstrating a progressive commitment to innovate and to share new skills and know-how.

According to G. Buciuni and G. Pisano, the consortium company Cluster A/C is an excellent example of a network knowledge integrator, working as a bridge between the global market and the local entrepreneurial ecosystem, combining internal strategic and internationalization skills. In this way, the cluster becomes a source of internationalization and development, currently supporting and coordinating 10 business networks, involving 70 companies, operating on 16 international markets, structured in commercial operations and direct control. This cluster, intended as a supra-district organization and a consortium entity, also acts as a cluster manager, managing and coordinating the business combination, having no preferential relations between companies and enjoying an high level of specialization. In this way it becomes capable

of integrating the knowledge and the industrial and manufacturing specialization of local SMEs with the skills, resources and external knowledge.

Here, in the context of knowledge integrators, as well as in the establishment of a knowledge society, a knowledge supply chain, a learning society and a local innovation system, the policies and the relations with institutions play an extremely crucial and vital role. These relationships, with research and development centers, public and private institutions and bodies, such as the regional banking system, Confartigianato, Confindustria, Unindustria, Federlegno and the Friuli Venezia Giulia Region have led to the creation of numerous policies, in the managerial, organizational, productive, procedural, financial and administrative fields. Among the goals achieved by the implementation of these policies we highlight the establishment of certifications related to the management of production, organization, processes, technological and environmental changes, and aimed at safeguarding health and safety at work. Beside these certifications, we find those related to industrial, productive, social and sustainable requirements. These policies also include encouraging new employment, start-ups or manufacturing businesses, technological modernization, regulatory compliance, synergistic relationships with other business networks and participation in events, fairs, showrooms and exhibitions in external territories.

Finally, the role of the cluster as a network knowledge integrator remains attentive to the constitution of development initiatives born from the implementation of new policies. Among the 25 active initiatives we highlight those present in internationalization strategies, such as Italia for Contract, Make My Design, Italian Chair District For International Markets, Tailor Made Contract, Asquadra, International Center of Italian Design and International Platform. These initiatives, in a commercial, industrial, social and cultural perspective, are aimed at penetrating, through direct access, new markets (mostly emerging) forming a complementary production and commercial network. This combination of local aggregation and international preside aims to promote a productive local fabric capable of surviving the current globalized context, pressing on competitive and developing drivers such as Italian design, Made in Italy and above all the creation and the transfer of information, know-how and knowledge.

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Acknowledgement

I would appreciate to say a few words to thank those people who supported and helped me during this course of study.

First of all, I would like to warmly thank my supervisor, Professor Giancarlo Corò, who, with extreme availability and precision, helped and guided me during the drawing up period, transmitting the necessary passion, knowledge and enthusiasm. Moreover, he provided me valuable advices, explanations, indications and corrections, giving more concreteness, without which I would never have been able to complete my work and my thesis.

Outside the university context, I strongly want to thank my colleagues, who have worked and cooperated with me during these years of studies. I especially refer to all the collaborators met in Benetton s.p.a., Burgo Group s.p.a., De Longhi s.p.a., Marchiol s.p.a., O.M.D. s.r.l. and Poste Italiane s.p.a. for the learning period offered to me, not only at work level, but especially at personal level, which has had a strong evolutionary impact on my personality and for which I will always be grateful.

Warmest thanks go to all my friends, who, even if in a very veiled way, have strongly contributed to give me support during the achievement of this goal. An heartfelt thanks for having shared experiences, commitments, discomforts, joys and satisfactions, supporting each other constantly.

Finally, I affectionately thank my parents, for their support, economic and above all moral one, for the advice, patience, their ability to listen to me and their unconditional loving support, which allowed me to find the necessary strength to arrive at this new terminus, that is a point of arrival-beginning of my life.

My honest and sincere thanks to everyone.

Devid Biscaro