

External relations and industrial districts

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Introduction

The competitive advantages of firms have in recent years been related to dynamic capabilities. The dynamic capabilities of firms relate to the ability to respond to changing environments and create new and improved products and processes through the process of innovation. At the same time external firm relations and the co-ordination and absorption of knowledge produced outside the firm are seen as crucial requirements for these dynamic capabilities.

The fact that knowledge is dispersed among agents and contextual determined entail costs and problems in the process of co-ordinating and absorption of external knowledge in the firm. The aim of the project is to contribute to a better understanding of how firms respond to the need of establishing external relations and receive knowledge produced in different spatial contexts to ensure their competitiveness in a growing global market.

Three questions will be addressed in this paper. First I will approach the question why firms establish external relations, which is mostly explained by the growing division of labour. Secondly I will focus on the costs and problems related to the co-ordination and absorption of external knowledge. The answers will be related to transaction cost theories and the fact that firms face cognitive limitations, which entails problems of absorbing knowledge through external firm relations. Different organisational forms of firms exist to overcome some of the costs and problems related to co-ordination and absorption of external knowledge. One way has been to internalise the production, other ways have been to establish different kinds of networks, where the success of the networks are dependent on the structure and characteristics of the network in relation to what kind of knowledge to be transferred. In this paper I introduce the industrial district as one organisational form, and the third and last question is how industrial districts respond to the transaction cost of external relations and the cognitive limitations of firms. A central hypothesis is that industrial districts, due to their way of distributing knowledge and the presence of an innovation system, reduce the transaction costs of co-ordinating dispersed knowledge and enhance the absorptive capacities of firms in some industrial districts. In this way the definition of organisational forms include the internal structure of the production in the firm and the organisation of the more stable processes of learning in the firm. So the organisational form of a firm can both be network-based, cellular, internal or related to the location in an industrial district.

This paper represents the theoretical approach to a field-study that will take place in the industrial district of Montebelluna in NE-Italy producing fashionable high performance leisure and sports shoes.

1. Knowledge and external relations

In this chapter the reason for the increasing need of firms to access external knowledge through inter-firm relations are explained by the growing division of labour and the need to establish close relations with an emphasis on co-operation because of co-ordination of complementary but dissimilar activities among firms. External relations are relations that lie outside the organisational form of the firm from which the firm can exchange goods, information and knowledge. In the paper I distinct between the concept of information and knowledge. Information is the access of firms to different data, which becomes knowledge, when the information is interpreted. The exchange of knowledge between firms is central in this work. Still the concept of information will appear, when firms search for information, which will be interpreted later in the process of absorption.

The fact that knowledge is contextual and hard to transfer is related to the absorptive capacity of firms, which is crucial to the ability of the firm to absorb external knowledge. The paper use the definition of Cohen and Levinthal of absorptive capacity, which covers the ability of firms to recognise the value of new external information, assimilate it, and apply it to commercial ends (Cohen and Levinthal 1990). This definition includes several mechanisms, which are dealt with separately in this paper. Examples are co-ordination and transfer of knowledge. The knowledge, which is transferred from one firm to another, can both be related to intangible and tangible goods and activities. The emphasis on absorption of knowledge through close relations between firms exclude the role of other sources to knowledge and information, such as written material of scientific work, magazines, patent-data or other kinds of data.

1.1 Division of labour and specialisation

Following the concept of division of labour introduced by Smith in 1776 firms have got the opportunity to increase productivity and the knowledge pool of the firms by creating more and more specialised knowledge through the process of division of labour.

The increase of knowledge takes place as firms divide the production into more simple operations, where every man only control a part of the production process. In this way the ability of each person to improve both the quality and the quantity of what the person produce will rise just as the knowledge pool (Smith 1981).

“ As a result (*of division of labour, red*) each individual becomes more expert in his own peculiar branch, more work is done upon the whole and the quantity of science is considerably increased by it (Smith 1981 (1776) 115).”

The degree of the division of labour seems to be influenced by the size of the market, which makes the present situation with a growing globalisation and increased access to new market even more favourable for an extended division of labour (Smith 1776).

The specialisation comes along as a result of the division of labour, which entails the growth of knowledge in small limited work operations, with the ability of perception of detailed anomalies that would not be recognised in a broader perspective (Loasby 2000).

The growing division of labour also entails an increasing division of knowledge, an important issue of the work of Hayek, and his work on how knowledge, which is not given to any person in totality and therefore is dispersed, is co-ordinated most effective.

The division of labour can be seen as a respond to the limits of human cognition, which implies that we are only able to hold a certain amount of knowledge. In this way the cognitive limitations constitute a part of the explanation of the existence of firms. Often firms will consist of more than one person to be able to fulfil just simple tasks, and to take advantage of the fact that a group of people within a firm having a common interest, can amplify the information and knowledge in solving problems (Grandori 2001).

Still limitations within firms exist. In this paper it is argued that the limits to firms are related to the need of firms to create cohesion and common beliefs within the firm, which is inspired by the work of Loasby, and will be presented later.

1.2 Co-ordination and planning in a system of dispersed and limited knowledge

The specialisation of firms, both as a result of the division of labour, and as a way for firms to develop and concentrate on core competencies, have created the demand of firms to utilise the knowledge produced by other firms to be able to produce useable end-products. From the point of view of the single firm, it will only establish external relations or exchange transaction outside the firm as long as it cheaper to conduct the production or knowledge creation outside the firm than inside (Coase 1937/1988).

The need of firms to have access to and utilise external knowledge is related to different kinds of transaction costs. Dahlman (1979) have identified three types of transaction costs attached to the establishment of external relations: search and information costs, bargain and decision costs, policing and enforcement costs (Dahlman 1979 p: 148).

Most of these costs are related to the fact developed by Hayek that knowledge is dispersed among economic agents (Hayek 1937). The problem with dispersed knowledge here is that economic agents need to take into accounts the actions and plans of other agents to be able to realise their own plans. A compatibility of plans of the different agents has to exist for the firms to ensure efficiency in their production. Foresight is crucial in this relation, which entails that the different individuals hold the same expectations, which are based on what people actually know. The interaction among the agents and their experiences results in more and more correct expectations.

The problem with the dispersed knowledge among agents and the problem of firms to gain competitive advantages in summarised well here by Malmgren:

“ But if information about other firms’ plans is limited, and if consumers desires and expectations are only partly known, or guessed at, the firms long run success will depend upon its informational advantage over the market in its own area of production and upon its ability to achieve expectations which are consistent with other firms’ expectations (Malmgren 1961 p: 408)”

Still knowledge among the different agents will tend mostly to be uneven distributed, leaving the agents with different expectations. Equilibrium¹ will only exist in limited periods, then knowledge will become uneven distributed again. Hayek has named this process a state of equilibrium. When a state of equilibrium exist in a society it means that compatibility exists between the different plans which the individual composing it have made for action in time. The equilibrium will only last as long as the external data correspond to the common expectations of all the members of the society (Hayek 1937).

To reduce the costs of searching and selecting the right knowledge and to plan according to corresponding expectations, it is pointed out that time, shared experience and repetitions together with long-term inter-organisational contracts are crucial features to lower the costs as they create practises and shared expectations (Hayek 1937, Malmgren 1961).

In the work of Richardson 1972 it is argued that the nature of activities being co-ordinated influence how the co-ordination takes place in relation to different organisational arrangements. According to Richardson the boundaries of the firm are defined through the capabilities, which reflect the knowledge, experience and skills accumulated in the firm. Activities (production, service, marketing, R&D) of the firm is based on these capabilities.

Co-ordination of activities can be done either through direction within a firm, through the market or through co-operation between firms. What kind of organisational arrangements chosen depends on the nature of activities, which are going to be co-ordinated. In this way similar activities will tend to be co-ordinated within the firm. If the activities wanted by the firm are neither similar nor complementary then the co-ordination will take place in the market. Lastly, activities, which are complementary and dissimilar to the activities of the firm, will tend to establish an inter-firm relation based on co-operation, because a match, both qualitatively and quantitatively of the plans are needed. Richardson suggests that the inter-firm relations require a degree of stability, which is important for two reasons. The first is to induce subcontractors to accept the risk inherent in narrow specialisation in skills and equipment, and second it permits continuing co-operation between those concerned in the development of specifications, processes and designs (Foss 1996, Richardson 1972). The growing specialisation will often result in an increase in organisational arrangements or external relations, which favours relations characterised by co-operation.

1.3 Transfer and absorption of external knowledge

The previous pages have primarily focused on the transaction costs related to the search and co-ordination between firms. Now costs of the process of accessing and utilising external knowledge of firms will be identified and dealt with in a way that takes into account that knowledge is contextual. The statement is here, that even though knowledge is available and free of charge, it is likely to be costly to implement external knowledge, and make use of it in the firm. The problem of cost relates to the assumption that knowledge is dependent on the context in which it is created (Becattini & Rullani 1996). Contextual knowledge is often connected to personal experiences, to interpretation and memory, and essentially remains tacit and informal. The process runs through several stages, which are described below in the quotation of Cohen and Levinthal. To transfer this knowledge outside the context in which it is created, it is required that the tacit knowledge become codified and

¹ The concept of equilibrium is used by Hayek and covers the situation, where compatibility of plans of individuals exist. No other meaning is here related to the concept of equilibrium.

by that transferable. Four stages are identified in the process of codifying contextual knowledge to make it possible to transfer²:

“...*(a) socialization* of the contextual knowledge, whereby shared experiences are extended to more people or to more places; *(b) conversion* of contextual knowledge into codified knowledge; *(c) re-assembly* of the codified knowledge by combining many elementary notions into a complex expression; *(d) absorption* of codified knowledge in real operative processes (Becattini & Rullani 1996 p: 163³)”.

The processes of socialisation and conversion are related to the context in which the knowledge is created, where as re-assembly and absorption of knowledge are connected to the codification and actual transfer of the contextual knowledge. The absorption of the external codified knowledge in the receiving firm has the aim to implement the knowledge into operative processes and restart the process of conducting contextual knowledge.

For firms to be able to absorb external knowledge some internal organisational characteristics have to be present.

Cohen and Levinthal have described the relation between focussing on structuring internal or external knowledge in relation to the ability of the firm to absorb knowledge from external relations. The absorptive capacity of the firm can either be focused at creating firm specific knowledge or support the absorption of external knowledge.

“ With regard to the absorptive capacity of the firm as a whole, there may, however, be trade off in the efficiency of internal communication against the ability of the sub-unit to assimilate and exploit information originating from other sub-units or the environment. This can be seen as trade-off between inward-looking versus outward-looking absorptive capacities. While both of these components are necessary for effective organizational learning, excessive dominance by one or the other will be dysfunctional. If all actors in the organisation share the same specialized language, they will be effective in the communicating with one another, but they may not be able to tap into diverse external knowledge sources (Cohen and Levinthal 1990 p: 133).”

² In the work of Becattini & Rullani the knowledge creation and transfer are related to industrial district or poles.

The success of the absorptive capacity of the firm is dependent both on the internal organisation of the firm, the interface of the organisation with the external environment, the history and the future of the organisation. The interface with the external environment is dependent both on the absorptive capacity of the individuals in the organisation and the organisational setting to deal with external information. The interface function can be centralised or diffused across individuals. If the knowledge needed from external relations differs a lot from the knowledge in the organisation the interface with the environment will be conducted by a gate-keeper, which function will be centralised. Here the gatekeeper monitors the environments and translates the knowledge to the others in the organisation. If the external knowledge is familiar to the organisation the role of the gatekeeper is less important.

Under conditions of rapid and uncertain technical change the central gatekeeper may not be the best organisational solution. In this situation a broad range of prospective receptors to the environment are necessary in the organisation. This requires that the group share some background knowledge. Competitiveness in firms with a high product innovation rate will often require strong links between problem-solving cycles and such successful linking will often require personal contacts. In contrast a process where one unit simply hands off design to another unit is likely to suffer great difficulties (Cohen and Levinthal 1990).

If firms fail to develop their absorptive capacity in a period they will not be able to follow innovations and change in their environments, as they will not be aware of the significance of the signals or just not appreciate them. In this way the absorptive capacity of firms are linked to their own research and development units, as they will not only create new knowledge to the firms but also enhance their absorptive capacity.

In this way research and development in the organisations enhance the absorptive capacity, which makes them better to recognise the value of new external information, assimilate it and put it into commercial ends and by that improve the technical knowledge of the firm (Cohen and Levinthal 1990).

1.4 Organisational changes as a result of inter-organisational knowledge transfer and learning

According to James G. March the absorption of external knowledge into an organisation is one of several ways that organisations can adapt and change through learning.

³ The four stages have been identified by J. Nonaka.

What distinguishes organisational learning from individual learning is the ecological nature of organisational learning. Each organisation adapts to an environment consisting of other organisations, each of which consists of interacting learning individuals and subgroups. An example of this kind of inter-organisational learning is network linkages among firms. Much learning that takes place in an organisation is encoded into rules and routines that guide organisational behaviour. In relation to the coherence within the organisation rules exist to structure actions and modifies behaviour. Changes in rules are often associated with changes in external pressure.

These changes can be both good and bad. Risk of concentrating on wrong strategies because of habits and competencies exists, leading to competence trap or lock-in situations. It is recognised that changes might suit one firm well, but not necessarily the other. Changes should also be seen in a time perspective and in this way distinguish between the outcome of short-run and long run actions. Here it might as well be that changes causing problems in the short run result in improvements in the long run (March 1995).

1.5 Summary

The increasing division of labour and specialisation of firms to stay competitive have resulted in a need of firms to get access to and absorb external knowledge. Firms face cost in this process, where the features of dispersed and contextual knowledge are central. To be able to plan and create mutual expectations firms must co-ordinate the dispersed knowledge. For firms to make use of knowledge created in a different context a process of codifying tacit knowledge, transferring and reassembling of knowledge must take place. The success of the transfer and the reassembling of the contextual knowledge is a result of the absorptive capacity of the firm. Following phenomena has been pointed out to reduce the cost of search and co-ordinate knowledge, and to meet the requirements of absorptive capacities of firms.

To lower costs of searching and co-ordinating knowledge, it has been suggested that time and mutual experiences together with long-termed inter-organisational contracts are crucial features, as they entail practises and trust. Long term inter-organisational contracts require stability, which is important for two reasons. The first is to induce subcontractors to accept the risk inherent in narrow specialisation in skills and equipment, and second it permits continuing co-operation between those concerned in the development of specifications, processes and designs. The cognitive limitations of firms, which cause trouble to the absorptive capacity of firms, can be eased through prior knowledge in the firm. Prior knowledge and the engagement in R&D activities in the firm will ease

the absorptive capacity, as it is easier to apply additional knowledge to already existing knowledge. This cumulative absorptive capacity enhances the ability of firms to predict more accurately the nature and commercial potential of technological advantages.

Changes in firms can be established through knowledge transfer among firms. Through inter-firm knowledge transfer learning can be accomplished, resulting in new rules and routines, and in this way changing the behaviour and actions of the firm.

Learning through the absorption of external knowledge can be approached differently by organisations and firms. In the next section industrial districts will be presented as one out of many organisational forms.

2. Industrial Districts

Industrial districts as an organisational form of firms will here be approached like one possible way to respond to problems related to external relations, as cognitive limitations of firms and the transaction costs connected to the dispersed and scant sources of information.

The special abilities of some industrial district to diffuse knowledge and information in an efficient way and the learning processes in the innovation system constitute the central explanatory features to the reduction of cost and difficulties of absorbing external knowledge.

2.1 Industrial districts, definition and contents

The definition of industrial districts will here cover the spatial agglomeration of similar and/or related firms. The concept relates to a sub-regional area with a specialised industrial production.

The institutional set-up and collective action of agents within the system have a crucial impact on the competitive advantages of the industrial district.

The concept of industrial district is closely related to the work of Marshall and his theory of external economies, which can develop within an agglomeration of firms in the same industry.

These external economies are a result of links between firms, institutions and infrastructures within a geographical area. The external economies include access to a labour market with specialised skills and the development of specialised inputs and services, and the knowledge spill-overs that arise. The external economies lowers transaction costs and rises benefits of firms. Where Smith explained the division of labour between specialised industries, Marshall underlined the development of variation within a specialised production. In recent studies the division of labour within the specialised production in industrial district has been approached like a cognitive division

of labour (sharing competencies in a community-district or through open networks) (Loasby 1998, Marshall 1890, Pilotti 2000).

Relations within industrial districts are often characterised by trust and a certain mixture of co-operation and competition. These features exist as a result of inter-dependence, common beliefs and value, and possibilities to punish opportunistic behaviour. The institutional set-up within the industrial district acts as a direction for the behaviour of the agents. The result of the socio-economic institutions, industrial specialisation, and the geographical proximity is a process of collective actions among the economic agents in the industrial district, that reduces the cost of propagating information, knowledge and learning (Bellandi 1996, Maskell *et al* 1998, Dei Ottati 1998). The success of the reduction in cost due to the prevalence of stabilising institutions in the districts can hamper the need for change. The existence of new-comers, exit and entry of firms and external relations are suggested features to avoid that stability becomes rigidity (Belussi 2000, Loasby 1998).

2.2 Evolutionary approach to industrial districts

To incorporate the dynamics of change and adaptation, which can be found in some industrial districts, the evolutionary approaches and the interpretation of the industrial district as an *evolutionary space*, that focus on learning and knowledge creation, has proven a good explanatory framework (Belussi 2000 p: 1+ 2)⁴.

The evolutionary approach to industrial districts is based on evolutionary theory. According to evolutionary theory firms are seen as different organisations with their own internal resources on which they base their learning and knowledge creation. This entails different ways to obtain and utilise knowledge and information from other firms and their environments. Following the evolutionary theory and the concept of path dependency the former choice of the firms will have an

⁴ Before I turn to a short description of the evolutionary approach I will point out, by using the following quotation, that the industrial district and the attached mechanisms to this organisational form do not entail success by themselves: "The emphasis is put on a wide spectrum of patterns of growth, stability and decline. The patterns of change are not at all characterised by any optimality. Indeed they are the result of agents actions establishing various mutually co-ordinated behaviours that, in specific circumstances, enforce organisational learning, knowledge creation and knowledge transmission. Thus, the development of D/LPS (district/local production system), may lead either to path-dependency, irreversibility, and lock in, or to accelerated Schumpeterian forms of "localised dynamics" and growth "(Belussi 2000 p: 2).

In this work there is a focus on the positive aspects of industrial districts as they contribute to understand the competitive advantages of industrial districts as an organisational form, which forms a good response to the demands of the new knowledge economy.

impact on the future development of the firms and how they will adapt to external pressure and possibilities and conduct learning and knowledge creation.

In the evolutionary approach the dynamics of industrial districts are based on different patterns of growth. The different patterns of growth through knowledge creation and innovations can often be explained by the links between firms and the local environment and the organisational and technological set up in the region. The organisational and technological set-up in the region covers the fact that industrial districts include different actors both within the district and among them.

(Belussi 1996, Belussi & Gottardi 2000 P:2, Pilotti 2000 p: 147).

Firm relations and networks are important features in the evolutionary approach as both the knowledge creation and the distribution of knowledge and information take place within these networks.

One of the important network constructions in industrial districts is the innovation system. The innovation system in the industrial district will form the central part of the explanation of the absorptive capacity and enlargement of the interpretative system together with its lowering of transaction cost due to its distribution of knowledge.

The innovation system holds the shared pool of knowledge, to which the members of the industrial district has access to. Further more the innovation system diffuse knowledge supporting knowledge creation and innovation in the system.

As indicated in the evolutionary approach the innovation system can differ due to the development path of the district. The innovation system is a product of both the organisation of the production entailing the network structure of the innovation system and the institutional set up in the district. The next chapter will relate the innovation system to these two features, which have an impact on the structure, content and performance of the innovation system.

2.3 The industrial district and the constitution of the innovation system

For each industrial district I will claim that coherence between the organisation of industry, the innovation system and the institutional set-up has to exist to make the industrial district competitive. All three levels are important to the knowledge creation in the district, but more over the interaction of the three levels determines the ability of change and adaptation in some industrial districts. The active interaction and adaptability between the three levels will influence the change and adaptability in industrial districts:

The organisation of the industry (structure)

The innovative system (processes)

The institutional features (basis)

2.3.1 The organisation of the industry

The organisation of the industry is important as it constitute the network structure for the circulation of knowledge, information and goods between firms and other organisations in the districts like educational organisations, service centres, financial organisations etc.

Different types of industrial districts exist due to different ways to organise the industry. Some industrial districts are characterised by strong internal relations between lead-firms and subcontractors. Other industrial districts will have the majority of their sub-contractors outside the district. A certain mix of different agents often constitutes industrial districts. Here, the role of meta-organisers is essential to knowledge creation and innovations. Meta-organisers is a phenomenon, which include firms and local organisations (private and public) which directly or indirectly are involved in the process of innovation in the industrial district (Belussi & Pilotti 2000a, Pilotti 2000).

The organisation of a district will often be influenced by special conditions of the particular industry. Some industries will be more innovative than others, just as some industries will be more exposed to global pressure and need for adaptation than others. Still most districts will face the need to change the industrial organisation to meet competition and take advantage of new technologies.

2.3.2 The innovation system

The concept of innovation systems will be used to analyse the absorptive and adaptive capacities of firms, which form the basis for innovation and knowledge creation. The concept deals with the ability to innovate in a region and can by its, even though very broad definition at this stage be used to compare different industrial districts. The innovation system derives from the concepts of national system of innovation and regional system of innovation. Here the innovation system related to the sub-regional level is very much alike the regional system of innovation, but related to the district.

The innovation system covers the processes of learning within the district, while the organisation of industry emphasised the structure.

The network approach related to innovation systems highlights the learning capabilities in some places with a certain mixture of relations between firms and organisations supported by socio-economic institutions within the industrial district. Innovation systems as a concept consist of elements or members and relations between them within the field of conducting innovations and knowledge creation. The innovation systems are characterised by their ability to create a collective order and their systemness:

“ The order comes from mutual understanding, trust and reciprocity among the collective economic community, and the “systemness”, where it exist derives from the relatively stable and regular flows of information among the members of the regional innovation community” Cooke in Braczyke 1998.

The knowledge in the innovation systems can both be produced exclusively within the innovation system of the district or it can be a combination of knowledge from outside and inside the district. The common development is that most industrial districts will be dependent on access to external knowledge to stay competitive (Becattini & Rullani 1996, Cooke 1998).

To illustrate different innovation system and their competitive potential a taxonomy of innovation system will be presented. The taxonomy is based on the work of Belussi and Pilotti, and their taxonomy of systems of knowledge creation within districts (Belussi & Pilotti 2000a)⁵.

The taxonomy consists of three types of districts:

1. The district, which base its knowledge on socialisation of internal knowledge.
2. The district, which base its knowledge creation on a recombination of absorbed external knowledge and different sort of knowledge coming from internal and external networks and agents, and;
3. Districts with absorption of external knowledge and development of new global knowledge with use of local tacit knowledge.

⁵ Inspired by the work of Nonaka and Takeuchi and their model of learning among individuals within organisations (Belussi and Pilotti (2000)).

Ad 1: Innovation systems with horizontal socialisation of local knowledge.

The knowledge pool is primarily based on tacit and local derived knowledge. The structure of the innovation system is formed by interactions of firms within the districts. Knowledge is transferred in production networks, where firms co-operate at arm's length. The inter-action of firms is based on the fact that they hold different knowledge. The knowledge distributed in the innovation system is mostly tacit and without the presents of innovation and expansion of the given stock of knowledge.

Ad 2: Innovation systems with absorption of external knowledge and recombination of global/local knowledge.

The knowledge pool within this kind of district is a mix between tacit and codified knowledge. External knowledge is absorbed, and a recombination of different sorts of knowledge takes place. The knowledge stems from both internal and external networks and agents. The global knowledge is absorbed both by firms and local organisations. The stock of knowledge grows incrementally, with the ongoing industrial activities. Firms learn to react and to adjust to market signals, to co-operate in dense, but territorially dispersed networks. The knowledge absorbed by firms and local organisations are spread among agents in the industrial district, as a result of imitative procedures. Sources of innovation is more formalised taking place in engineering departments and through local interactions with suppliers, sophisticated clients, local experts, suppliers of machinery and local organisations. Product innovations are frequent.

Ad 3: Districts with absorption of external knowledge and development of new global knowledge

This district represents the highest stage of development of the Italian industrial districts. Even though this kind of district has a high prevalence of codified knowledge, tacit knowledge is still important. The firms are technologically dynamic, and the leading firms in the districts frequently patent. In many firms formalised R&D-departments exist. A large amount of original knowledge and (systematic radical) innovations are created to feed the global circuits. The district is an exporter of knowledge either through their products or disembodied. Not all firms in the district fit this description, but only a small group of innovative leading firms. These leading firms absorb external knowledge, combine it with new pieces of knowledge and transfer it to their subcontractors and specialised suppliers. Through time this knowledge creation process has enlarged the stock of knowledge in the district.

Even though codified knowledge is in focus in this type of districts the importance of tacit knowledge is stressed, as tacit knowledge is seen as central to the absorption and utilisation of external knowledge (Belussi & Pilotti 2000a p 7 – 8).

2.3.3 Institutional features:

As mentioned above socio-economic institutions within the district *support* the relations between firms and between firms and other organisations. The shared history and culture of the members in the industrial district implies that there, within the industrial district, is a collective system of values, norms and beliefs (Bellandi 1996). These institutions enable the members of the industrial district to predict the outcome of their actions, just as common language and trust ease the transactions.

Institutions in industrial districts will often be place related, as they are a result of the culture and history of the specific territory. The place related institutions often results in social learning processes of the people in the district (Maskell & Malmberg 1997, Witt 2000):

“Communication, particularly of the non formal kind that occurs in socialising with other agents, enables people to observe, and make comparison with the behaviours of others and their rewarding or non-rewarding experiences. The more frequent and intense the latter observations are, the more likely there are some similarities in the subjective representation of knowledge. In this way it is not only socially shared interpretation patterns that can emerge, so too can common tacit knowledge of facts, hypothesis, practises, skills, and actions, including socially shared knowledge of rewarding or penalizing experiences (Witt XXXX p:10).”

In this way institutions have an impact on the function of the networks, which constitutes the innovation system. The communication is eased as a result of both a common language in its formal sense but also as a result of the evolution of a common interpretative system. The interpretative system consists of both a shared subjective (what is good and bad) and an objective (knowledge of skills and practises) interpretative patterns.

The shared knowledge and the presence of institutions constitute a response to the transaction costs of exchanging knowledge within the industrial district.

In the work of March, presented earlier in this paper, learning in firms were influenced by their environments, to which the firm tries to adapt. Institutions in regions will have an impact on the way firms learn, as institutions have an impact on the behaviour of firms. The need to adapt to different kinds of external pressure through the utilisation of external knowledge can change the institutions of the firm through learning, which strengthen the adaptive and innovative capacity of the firm (March 1995). Following this line of arguments the change of the actions of agents must entail an impact on the institutions as well.

2.4 Summary

Industrial districts differ in their constitutions and performance as a result of the history, including choices and possibilities in the past. This will have an impact on the development in the future of these firms also in relation to their ability to adapt to external pressure and possibilities and their way to conduct learning and knowledge creation.

The constitution of the innovation system is a result of both the organisation of the industry, which has an impact on the structure of the network and relations defining the innovation system, and the institutional setting, which has an influence on the efficiency and functionality of the innovation system. Moreover the innovation system constitutes systematic, and by that predictable, distribution of information and knowledge. Following the logic of March the learning taking place in the innovation system will have an effect on the organisational setting of the firms. In this way the influence among the three concepts (organisation of industry, innovation system and institutional set up) is reciprocal.

The importance of institutions is also illustrated by the fact that they add something to the network approach to the innovation system. The institutions include a relational character of the agents, which is in excess of the network of the innovation system and entails an ease of transactions not only linked to a certain network, but in interactions in their totality in industrial districts. In this way communication and interaction not only linked to the network, but to all kinds of economic interaction, including the formation of new innovating networks.

3. Cognitive limitations and interpretative systems

The last part of the paper will focus on the approach to firms, which conceive the firm as an interpretative system and as a respond to the cognitive limitations of humans. The central proposal is that industrial districts constitute a competitive organisational form, an interpretative system,

which reduce the problems of cognitive limitations of firms and lower the cost of co-ordinating and absorbing external knowledge.

3.1 Firms as interpretative systems

In the work of Loasby firms are described as organisations that form a response to limits of human cognition. The firm is an interpretative system, which focus the device of the firm and structure the knowledge and skills within an interpretative frame. The interpretative frame constitutes the cognitive boundaries, which is reinforced by the emergence of locally relevant institutions. The aim of the interpretative system is to arrange and simplify the complex content of knowledge in a firm and affect what its members can learn and accomplish. Within this interpretative system some extend of cohesion, due to the interpretative framework, must exist to structure and rationalise actions due to an ambiguity of knowledge inputs and possibilities available. To obtain cohesion it is important to use compatible patterns of interpretation in the firm to create an orientation of the firm. Construction of beliefs shall help to take decisions and conduct activities, which are credible within the context of the firm. The description above is mostly related to the interpretative system and cohesion *within* the firm. To be able to obtain external knowledge created outside the firm, firms often have to operate with several interpretative systems, just as ambiguity within the belief set enhance possibilities for innovations and adaptation of knowledge (Loasby 2000). Because of this, new problems arise with address to the need of coherence within the firm and cognitive limitations. The presence of cognitive limitation puts the firm in a situation where there has to be at trade off between two extremes of interpretative systems. The firm must either hold a “broad” interpretative frame, which enable the firm to create general knowledge and implement knowledge created outside the firm, or an interpretative frame, which favours development of highly specialised knowledge. In the last case the interpretative frame will be “narrow”, firm specific, and hinder the implementation of outside knowledge.

The focus on the internal organisation within the firm and the central core-competencies of the firm is much in line with the resource-based view of the firm, which relates to the work of Edith Penrose (1959). Just as within the interpretative system of the firm the ability of the firm to learn efficiently and stretching knowledge assets within a set of core activities (Foss & Knudsen 1996). The competence based view of the firm consider the firm as a processor of knowledge, which leads to the recognition that cognitive mechanisms are of central importance and that routines play a major

role in keeping the internal coherence of the organisation. (Amin & Cohendet 2000). In this way the selection of distributed knowledge and co-ordination, phenomena included in the concept of absorptive capacity, become a concern of the governance of the firm.

Authority is the most common form of governance in firms. The importance of authority is being stressed as result of the growing specialisation and need for co-ordination of complementary knowledge among firms (Arrow 1974, Foss 2001).

Authority within an organisation is needed to achieve an efficient co-ordination of the activities of the members in the organisation (Arrow 1974). Authority can be divided in two forms: personal and impersonal authority. Personal authority is present when a person gives orders, which is carried out by others. Impersonal authority is carried out by codes of conducts in a society, which prescribe what each member of the organisation is to do under a variety of possible circumstances (Arrow 1974).

Arrows explain the acceptance of authority in a society with the use of these words:

“...authority is viable to the extend that it is the focus of convergent expectations....That is, the functional role of authority, its value in making the system work, plays a part, though only a part, in securing obedience. This functional role will only be influential if in fact the authority is visible and is believed to be respected by others” (Arrow 1974 p: 73).

The other part of enforcing authority is sanctions through control mechanisms. Authority is here related to the interpretative system as an relational action, which structures the interpretative system and develop and maintain belief structures to ease the task of taking decisions and conduct activities, which are credible within the context of the firm.

3.2 Industrial districts as interpretative systems

As argued, most industrial districts must be able to adapt to external pressure and innovate by the use of knowledge created in other firms. Following the thoughts of Loasby, firms hold different interpretative systems, some of them better to absorb external knowledge than others.

The same approach could be related to industrial districts. Industrial districts will with the existence of an innovation system be able to act as an interpretative system to the members, who constitute the innovation system.

The interpretative system in the industrial districts is presented by the innovation system, which focus the devices and structure the knowledge and skills. As noted by Loasby some extend of cohesion must exist due to structure and rationalise actions. The structuring of actions is formed by the constructions of beliefs to take decisions, which are credible.

3.2.1 Authority

Authority represents a way to enforce the devices and structure the knowledge and skills and rationalise actions. Authority can be found in firms but also, as suggested here, in the industrial districts. Different forms of authority related to industrial distric and firms are presented in the schema below:

	In firms	In industrial districts
Direct	Personal	Leadership
Indirect	Impersonal	Institutions Leadership

Personal and impersonal leadership is described in the former chapter “firms as interpretative systems”.

Leadership in industrial districts is related to the organisation of the industry, which has an impact on the innovation system. Leadership in the industrial districts is related to some firms having special ability to select and direct the actions of firms in industrial districts. Examples are the presence of middle-men, who establish the contacts between buyer and producer both within and outside the districts or the meta- organisers. The role of the meta-organisers:

“ .are to participate in the problem solving process of the firms belonging to the local production system⁶ related to innovative activity; they have the ability of contextualising and seeking out new problems to be dealt with, since they are the bridges and connectors (for the de-contextualisation or re-contextualisation of knowledge) between the district and the outside world” (Pilotti 2000 p:153).

The superior role of the meta-organiser in industrial districts directs the actions of the firms and through their definition of relevant problems plays an important role in the definition of the interpretative system of the industrial district.

Meta-organisers is a category of agents, which is found in highly competitive industrial districts, with innovation systems related to the description of innovative systems with absorption of external knowledge and development of new global knowledge.

Depending on the structure of the industrial district, the leadership can be either represented directly or indirectly. A direct authority will be present in a very hierarchical constellation between lead firms and their subcontractor. Indirect authority is present where institutions and meta-organisers have an impact on the co-ordination of activities and the belief structure in the innovation system, which enhance efficiency in decision making. It is possible to find both direct and indirect authority in the same industrial district. These districts, which can be found in the high competitive end of district, have an indirect authority of firms, which are represented as subcontractors in the district, but contribute to innovations through their external relations and impact on the lead firms. (Pilotti 2000). In some industrial districts a multi-divisional leadership will exist. Here one leadership will exist within the marketing division in the district, another leadership could be found within the production.

Going back to the work of Ulrich Witt, actions in industrial districts are guided by the place-related institutions as a result of common history and culture creating socially shared knowledge. The institutions in an industrial district will direct the actions of the members and modify the behaviour. In this way *codes of conduct* are represented in industrial districts and the possibility to create convergent expectations is presence through indirect authority.

Due to the existence of the authority, which creates directions of the activities, built on choices and selection of knowledge within a collective belief set, I will argue that industrial districts can be seen as interpretative systems.

3.3 Absorptive capacity

An important advantage of the membership of firms in an industrial district is that they are included in a wider interpretative system, represented by the innovation system. A system that a single firm never would be able to hold itself, because of cognitive limitations.

The innovation system has, due to the knowledge input it receives and had received from the members, and the internal and external networks that they hold, a pool of potential knowledge of which the firms can take advantages.

“ Because there are many firms, the industrial district has an important advantage over a single human brain in facilitating external assessments of the effectiveness of operating routines within each firm, by its customers, its suppliers and its competitors. Within such an environment individuals can also partially escape the limitations of their own brain by exploiting the differences between brains in the evolution of their internal division of labour; they can draw on vicarious experience, which appears directly relevant and discuss each others routines” (Loasby 1998 p: 80).

Having access to a shared knowledge pool and an interpretative system of the industrial district, the firms do not have to hold the total knowledge available. The firms can when they need it access the knowledge pool and absorb the knowledge that they need. This knowledge can at a certain time be both internal and external knowledge to the district.

When firms usually face the problems of choosing interpretative frames to meet the limitations of cognition, the firms with membership in an innovation system will have less problems as they have access to an extended cognitive perception.

In this way some industrial districts hold an interpretative frame, which favours specialisation for its member firms and favours the knowledge creation within the firm. Still at the same time the interpretative system gives them access to more general knowledge and an ability to absorb external knowledge (Cohen and Levinthal 1990, Loasby 2000).

The presence of an extended cognitive perception, due to the industrial district also allow the local processing of even more global knowledge in the district, that the same number of firms outside a district could never count for.

4. Conclusion

The aim of the project is to contribute to a better understanding of how firms respond to the need of establishing external relations and receive knowledge produced in different spatial contexts to ensure their competitiveness in a growing global market.

Three questions were addressed in the introduction. The first question was why firms establish external relations. In the paper the growing division of labour and specialisation primarily explained the reason to why firms establish external relations. The growing division of labour entails a need to co-ordinate the activities of firms, often within close inter-firm relations in which it is possible to plan and create mutual expectations, crucial to the efficiency and the competitive advantages of the firm. The costs and problems related to the absorption of knowledge through external firm relations formed the second question. As knowledge is a dispersed good, firms face costs when planning and co-ordinating the dispersed knowledge. Also the fact that knowledge is contextual determined leave firms with problems in the absorption of external knowledge due to cognitive limitations. In the paper the concept of absorptive capabilities of firms are introduced as the ability of firms to recognise the value of new external information, assimilate it, and apply it to commercial ends (Cohen and Levinthal 1990). To lower costs, related to searching and co-ordination of knowledge, it has been suggested that time and mutual experiences together with long-termed inter-organisational contracts are crucial features, as they entail practises and trust. Long term inter-organisational contracts require stability, which is important for two reasons. The first reason is to induce subcontractors to accept the risk inherent in narrow specialisation in skills and equipment, and the second reason is that it permits continuing co-operation between those concerned in the development of specifications, processes and designs. The cognitive limitations of firms, which cause trouble to the absorptive capacity of firms, can be eased in the sense that prior knowledge in the firm. Prior knowledge and the engagement in R&D activities in the firm will ease the absorptive capacity, as it is easier to apply additional knowledge to already existing knowledge. This cumulative absorptive capacity enhances the ability of firms to predict more accurately the nature and commercial potential of technological advantages.

Even though the costs of absorbing external knowledge through firm relations seems large, the transaction cost economies also tells us that firms will only access knowledge from external relations as long as it is less expensive than to produce the knowledge within the firm. The cost of approaching external relations might be stable, even though some arrangement can be done to lower

the cost. Still the development within the division of labour and specialisation leaves it hard for a firm to hold activities, which is not within their core competencies, if they want to stay competitive. The third and last question approached in the paper was how industrial districts respond to the transaction cost of external relations and the cognitive limitations of firms.

The presence of an innovation system, which represents the learning processes taking place through firm relations in the industrial district, is crucial to both the knowledge diffusion and co-ordination among the economic actors. Both the institutions and the organisation of the production have an impact on the innovation system and its ability to adapt in general, and of special interest in this paper, to respond to the problems of external relations. The three concepts: organisation of industry, the innovation system and institutions constitute the industrial district. Three types of innovation systems are described in relation to the input of respectively internal and external knowledge. The most competitive and dynamic innovation system where the one, who combined the global absorbed knowledge with the tacit local knowledge. This kind of innovation system could be seen as a processor and contributor of global knowledge. In this innovation system R&D took place in firms, which previously in the paper were introduced as a firm related activity that enhanced the absorptive capacity.

Institutions in the industrial district, represented by shared norms, beliefs and values, not only lower the transaction cost but can create a flexibility and an ease of economic interaction in excess of the networks, which support the ability of the industrial district to adapt to external pressure. In the end it is suggested that industrial district, in its ability to constitute a shared interpretative system, to which the members of the innovation system have access, will lower transaction costs and enhance the cognitive frame of the firm. This shared interpretative system is managed through direct or indirect authority enforced by the presence of leadership by lead-firms and meta-organisers and institutions in the district, which represent codes of conduct.

The authorities of the industrial district direct the activities, built on selection and choices, within the collective belief-set.

The shared interpretative frame of the firms in the industrial district creates a pool of knowledge to the disposal of the firms. The result is that the firm gets access to knowledge in an amount that an interpretative system of a single firm or even a progressive network could never hold. This enhances the absorptive capacity of the firms and the industrial district in total. Even more important, it allows the firm to hold an interpretative frame favouring the creation of specialised knowledge, but with an access to a knowledge pool, from which the firm get a broader input of

knowledge, which enhance the ability of the firm to absorb knowledge from external relations. In this way some industrial districts will be able to exclude the trade off that firms meet in choosing interpretative frames which either favours the creation of specialised knowledge within a “narrow” interpretative system or a “broader” interpretative system, which favours the absorption of external knowledge within the production of more general knowledge.

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