Marshallian Industrial Districts Revisited. Part I[1]

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Abstract

Marshall pointed out that a specific form of industrial organisation (industrial districts) increased the wealth of some regions in England and Germany, and connected it with the accumulation of capital and investment, social capital, externalities and increasing returns. In his view, industrial location was closely linked to demography, local governments, freedom and social institutions. He recognised that districts were a main territorial framework for knowledge-based economic growth.

The notion has attracted a widespread and so far unanticipated interest in both economic policy and academic research. Becattini and Bellandi rescued the Marshallian notion of external economies to the firm and internal ones to the district and applied it to the Italian districts and examined the extent to which the district as a contemporary theoretical construct is ultimately explicable by conventional neo-classical (Marshallian) economic categories of 'externality' and 'agglomeration'. As a by-product of this valuable enterprise, some confusion arose regarding the usefulness of the original framework applied to more recent developments. With extensive reference to his own words, the author demonstrates that his writings on the subject of industrial districts provide an interesting exploration of issues still very relevant today.

This paper intends to contribute to a renewal and revision of the seminal concept of Marshallian industrial district to distinguish it from further developments of this idea inside the field of industrial organisation. It provides a comprehensive view of the topic of industrial districts from this standpoint, and shows how Marshall's analysis connects it to other themes and issues in his economics.

Key words: industrial districts, alfred marshall, industrial organisation.

1. Preface

The industrialised world is presently undergoing a sea change in the course of its economic vitality. The large vertically integrated company is viewed as a dinosaur, unable to compete in a post-industrial world characterised by the need for more flexible forms of inter-firms interaction. Small and medium size enterprises (SME), considered either as atomistic competitors or as members of interdependent networks, have become the most important creators of new jobs and the seedbeds for cutting-edge innovation (Harrison, 1991, p. 471). The point is to show that there exists a craft alternative to mass production as a model of technological innovation, giving all its credits to the ability of workers, decentralised innovation, and co-ordination (through markets and reciprocity) among firms.

The most interesting twist on this theme is the emergence or the survival of networks of mostly small, linked but generally loosely coupled, spatially-clustered manufacturing firms, typically built around a craft form of work organisation. The paradigmatic industrial districts located in that region are known as the 'Third Italy'. The model is based on the diffuse presence of knowledge all over the network, far away from the model of mass production. The outcome for the group is greater skill and productive knowledge; for each factory are external economies of scale over time, derived from localised inter-firm specialisation. Knowledge – with learning as the most important process – is recognised to constitute one of the few important sources of competitiveness. Networking has been identified as a precondition for learning.

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The observation of high localisation of industries and institutions oriented towards the same sector of production or related activities is not wew. Indeed, it was such a striking feature of the process of industrialisation that attracted a great deal of attention in the later 19th century, with the growth of this kind of districts or clusters. Inside, firms co-operate on getting new work into the district, in forming consortia to obtain cheap credit, in jointly purchasing raw materials, in bidding on large projects and in conducting joint research. It is a heavy localisation of relationships among firms, which enables to study the permanent features, laws of creation, growth and decline.

Literature on districts is much too extensive to cite, since it became a pivotal concept in industrial organisation during the 1980s. Notable examples over the years include Best (1990), Piore and Sabel (1984), Porter (1990), Krugman (1991), and Benko-Lipietz (1996). There are also considerable works about the Italian model, of such authors as Bagnasco (1977), Becattini (1979), Brusco (1986) and Garofoli (1991). In Spain, we note Trullén (1990), Costa (1995), Castañer (1996) and Azúa (1998).

During the last years, we have seen a variant in the development of regional economic policies based on the concept of 'endogenous potential', giving a pivotal role to local authorities (Trullén, 1990, p. 151). Regions genuinely can improve domestic economy through a globalised connection. In the information society there are not only the companies that are striving for competitiveness, but also the regions that are striving for competitiveness. Small geographic areas can host all the drivers that are necessary for setting a 'healthy' base for companies. The analysis unit is now a simple valley or a declining industrial zone.

Borders between nation states are disappearing. It seems that regions have taken over the role that nation states used to play in the past. Why is it that we should concentrate on regions as an area base? What are the advantages of this new focus? First, regions (or districts) have a smaller area base to cover in which it is easier to define a common culture and to formulate an appropriate strategy. Second, regions control the key drivers necessary for finding new resources and creating wealth. Finally, the identity of a small geographic area is easier to define (Azúa, 1998). It makes sense to study the whole process from the districts' perspective for implementing regional economic policies.

The idea that clustering of producers in a particular location yields advantages, and that these advantages in turn explain such clustering, is an old one in the history of economic thought. But there exists original concept of *industrial district* due to Alfred Marshall (1842-1924) who knew off hand the new patterns of industrial organisation, and what caught the most his attention was these concentrations of specialised industries in particular such areas as Lancashire, Sheffield or Solingen (ch. X, book IV of *Principles* is devoted to analyse it). To those who imagine that increasing returns are something only recently discovered, it is startling to see how much attention is paid in Marshall's *Principles* to local externalities. They are emphasised both for their intrinsic importance and for the way they exemplify his concept of external economies in general (Krugman, 1995, pp. 49-50). Small firms in those districts develop and exploit new technologies without neither increase in size, nor mass production.

Marshall pointed out that this specific form of industrial organisation increased the wealth of some regions in England and Germany, and connected it with the accumulation of capital and investment, social capital, externalities and increasing returns. In his view, industrial location was closely linked to demography, local governments, freedom and social institutions. He recognised that districts were a main territorial framework for knowledge-based economic growth.

The notion of industrial district has attracted a widespread and so far unanticipated interest in both economic policy and academic research. Becattini (1979, 1989) and Bellandi (1989) rescued the Marshallian notion of external economies to the firm and internal ones to the district, applied it to the Italian districts and examined the extent to which the district as a contemporary theoretical construct is ultimately explicable by conventional neo-classical (Marshallian) economic categories of 'externality' and 'agglomeration'. As a by-product of this valuable enterprise, some confusion arose regarding the usefulness of the original framework applied to more recent developments. With extensive reference to his own words, the author demonstrates that his writings on the subject of industrial districts provide an interesting exploration of issues still very relevant to-

day. I am not wondering if it still makes sense to speak about industrial districts, but to come back to the seminal idea.

I will attempt to revise the seminal concept of Marshallian industrial district to distinguish it from further developments of this idea inside the field of industrial organisation. This paper provides a comprehensive view on the topic of industrial districts from this standpoint. It shows how and why Marshall's analysis connects to other themes and issues on his economics.

2. Concept

Networks are more difficult to define than organisations; they are set of loosely connected relations between individual persons and organisations (firms), with attributes of both kind of relations are often without the formalised structures of organisations. Under the condition of globalisation, flexible specialised networked actors, involved in collaborative and competitive relations, characterised by institutional thickness (Oinas, 2000, p. 59). Interaction is governed by conventions and results in learning within localised relations because its tacit elements, and stimulates the creation of unique assets for competitiveness of both firms and their local environments

It includes three kinds of actors: the individual person; the social network in which people participate when they learn; the organisation (firm, school, local government). They are often instrumental in the imitation and diffusion of a body of knowledge (incorporated in research institutes and laboratories, higher education facilities). The network concept is enigmatic and appears in many shapes and forms (Lambooy, 2000, p. 20). In economics synonymous for networks are 'strategic alliances', 'system-areas', 'clusters', 'joint-ventures', 'industrial districts' etc.

The unit of analysis to which Marshall referred is not the industrial sector but the district as a socio-territorial entity, in a concrete area, historically tied, of a community of people and a number of firms which tend to interweave. The conditions of population density, presence of infrastructure, industrial atmosphere, which are both the source and the result, the cause and the effect of that part of returns which cannot be explained either by internal economies of scale or by R&D, apply to the industrial district (Becattini, 1989, p. 132). It is this extra-element of productivity which made Lancashire, the Rhur and the Lombardy stand out the rest.

Its raison d'être, after all, is the generation of all kind of economies (Best, 1990, pp. 10, 233). He is quite explicit: "We will resume our inquiry as to how far the full economies of division of labour can be obtained by the concentration of large number of small businesses of a similar kind in the same locality" (p. 277), in other words, an osmosis between local communities and firms. The Marshallian idea of an industrial community ever more close united by the interchange of information was inspired more by Spencer's social biology than by Darwin's account of evolution (Thomas, 1991). It suggests a group of concentrated firms specialising along the lines of the Richardsonian distinction between similar and complementary activities and developing Penrosian experimental knowledge.

The spatial proximity of hundreds of companies that were of the same industry sector, and the mobility on the labour market that favoured a rapid interchange of production know-how within the region's companies, are seen as the main reasons for the industry's success (Schumann, 2001, p. 26). These two factors produced some stimulating effects. The number of companies of the same sector insured a strong competition between them. Each company was constantly forced to rethink production, producing either with lower costs or higher quality than the neighbouring companies. In the short run, the weight of the "organisation of trade" rests on the supplier who must look for clients (IT: 271-4), "the buyers have the upper hand" (IT: 272). The competition for clients' orders was complemented by a competition for qualified workers and engineers.

Certainly, Marshall offers a coherent and elegant explanation for why legally independent SMEs might cluster together in space, bound into extensive local inter-firm and inter-industry linkages, sharing access to a finely differentiated locally available labour supply and a 'commons' of business and social services, functioning as a decentralised "factory without walls" in which a spatial division of labour within each factory, providing in their proximity to one another an external economy to the large firms (situated mostly outside the districts) which are able to tap into the finely graded technical division of labour in the districts through the organisational mechanism of subcon-

tracting (Harrison, 1991, p. 475). Marshall contends that regions with agglomeration economies have better opportunities for developing a strong knowledge-base and for nurturing new growth opportunities: "the most efficient forms of constructive co-operation are seen in a great industrial district where numerous specialised branches of industry have been welded almost automatically into an organic whole" (IT: 599). Network behaviour may be both co-operative and competitive.

The origin and development of industrial districts are based on a localised assembly of certain socio-cultural features (a system of values, of behaviour, and of institutions), on historical characteristics of a geographic area (urbanisation, transport) and on the technical specifications inherent to a production process (short series, dissolved in stages' production) and also include the dynamic interaction (virtuous circle) between divisions and integration of labour inside the district, the constant searching for new openings to their goods, and the building of a net of strong external connections (Becattini, 1994, p. 48). Marshall argued that districts offer certain advantages when compared to more traditional types of organisation, which are the result of the spatial proximity of producers and the specific atmosphere beneficial to the exchange/emulation of knowledge, to learning effects and trust.

In such geographic clusters of industries, the structure of firms influences, and is influenced by the localisation of industry. Bellandi (1989, p. 136-7) points out that when Marshall writes on the "localisation of industry", sometimes he distinguishes between a "manufacturing town" and an "industrial district" (IT: 285). So, in the first sense, he explains that "railways connected nearly all the chief towns and industrial districts of England and Scotland" (IT: 69); or refers to the fact that "in all France there is no dense industrial districts nearly as large as can be found in England" (IT: 109). But he generally leaves this distinction apart from his analysis of the advantages of the 'localised industries' … so, it is possible to use the more generic industrial district.

Localisation leads to the development of external economies in terms of information flow, knowledge spillovers, and contacts with suppliers and buyers (Enright, 1995, p. 104). Localisation is often associated with low levels of vertical integration and diversification. In localised industries, geographic concentration may serve to limit the disadvantages that small firms are faced in respect to larger, vertically integrated firms: "there are an immense number of villages each of which carries on only one branch of production, or even only a part … one village makes nothing but spokes for the wheels of the vehicles, another nothing but the bodies and so on" (PE: 268).

It also can facilitate the negotiation and monitoring of collusive arrangements among firms. For districts to work it is not enough that localisation of firm, even it could be the ferment for mass production: "manufacturing industries … the best illustrations of the advantage of production on a large scale … the power of choosing freely the locality in which they will do their work" (PE: 278), in contrast to agriculture or mining. Sharing a culture increases innovation and upgrading which, in turn, increases knowledge. Increasing knowledge in a district will improve the internationalisation of companies and will lead to a greater regional competitive advantage.

An industrial district is organised to promote learning throughout the organisation, to integrate thinking and doing within production, and to promote teamwork across functional activities for the purposes of design refinement or new product development (Best, 1990, p. 13). Postulates of such a world were as followws:

1) any body of knowledge about the manipulation of nature can be elaborated and applied to production in various ways;
2) economic development is a reflection of politics and the distribution of power and wealth;
3) technological choices, once made, entail large investments in equipment and know-how, whose amortisation discourages subsequent different choices.

Learning as a collective action needs to be accepted as a meaningful strategy. Through knowledge new methods, systems, products and processes can be found. This can lead to greater demand, more revenue and faster processing which brings greater regional advantage and more value added. Codified knowledge lowers production costs and is an asset in itself. When knowledge can be codified and becomes proprietary information, it can be transmitted, primarily to other industrial district's persons or departments.

Thus, for a minority of firms which were able to grow, an active search to new market channels, the energetic contest for increased control over innovation processes through the use of trade marks, legal patent rights, etc., were of great importance (Magnusson, 1994, p. 90). It was obvious only through such methods, used in order to break out the matrix of an institutionalised structure which held back change, that some firms were able to achieve successful growth during the second half of the 19th century.

Sheffield was a good example of this kind of developments associated to the cutlery industry that in 1900 employed 16.000 workers in 2.700 cutlery establishments. This growth is indicated by the rapid increase of population between 1851 (135.000 inhabitants) and 1891 (325.000) (Pollard, 1959, p. 91). The possibility of finding work especially within the metal trades was the most important singular factor behind the great immigration to Sheffield in the end of the 19th century. This industry developed silver-plating and led the way in the production of crucible and speciality steels and the industrial use of electric-arc furnaces; a further indication of the vitality of these districts were the speed and sophistication with which they adapted power sources to their needs … in the middle of the 19th century Solingen experimented with small steam and gasoline engines; after 1890 they were using small electric motors (Benko-Lipietz, 1994, p. 28-31).

Sheffield cemented a structural duality between a 'modern' fast-expanding sector (in steel) and a 'backward' sector (industrial district) which continued to rely on traditional methods of production and selling (Magnusson, 1994, p. 90). Hence, the industrialisation to a large extent took shape within a matrix of structural properties: the continued reliance on small-scale methods of production, the dispersion of production and marketing activities, and the reliance on a high-quality produce for highly specialised markets. Marshall described the mid-nineteenth century Sheffield speciality steel district as a "factory without walls", a "single workshop" (IT: 600), an image he used to capture the aspect of the division of labour in which it was the community of all firms that together turned out the final product, not any single factory (or plant).

The basic limitation of such an approach was that, Marshall was at pains to emphasise the uniqueness of the individual –the individual product, the individual business and even the individual worker (Casson, 2000, pp. 110-1). But his commitment to the use of calculus meant that his model had to suppress all heterogeneity. The models were expressed in terms of representative individuals and representative firms.

While Marshall correctly expounded that the main feature of an industrial district is the emergence of external economies to the firm but internal ones to the industrial sector (efficiency in the way in which information spreads, and a good quality diffused expertise), he did not explain why any given type of economy (internal or external) falls into any given category (Casson, 2000, p. 110). Marshall's positive externalities (external-internal were called by Robertson) characterise the district as such and give it the uniqueness as organising model (Becattini, 1979, p. 10). The individual calculus of the production costs is no longer the criteria to explain the district's stability. It is possible for "a multitude of businesses of moderate size to attain nearly every important efficiency and economy that appear at first sight to belong exclusively to giant businesses" (IT: 593).

The basic idea is that economic agents cannot capture all the benefits of their activities in the prices on the market. Marshall noticed that craftsmen and tradesmen of the same sector occupied locations where they could see what others were doing and where they could emulate the successful entrepreneurs without having invested in basic research or in the costs of experiments (Lambooy, 2000, p. 28). Proximity to the others entrepreneurs was regarded as an economic asset offering comparative advantages ('external economies') in the process of a 'collective learning'. This spatial structure, with producers located in an industrial district, thus enabled them to produce more efficiently there than in other locations because of the advantages resulting from the spatial proximity.

Individual firms may be induced to enter the district because of the possibility for enjoying external economies. What Marshall meant by an external economy was not what later authors meant. He focused on the benefits to individual firms from the growth of pools of common factors of production –land, labour, capital energy and transport (Harrison, 1991, p. 474). He envisaged the model during his trip to America where "several eminent engineers 'pooled' their faculties in order to devise a general plan for the economical and rapid construction of aeroplane engines" (IT:

227). Pools are more likely to achieve 'critical mass' in the sense of coming to include a wide variety of specialities. Recall that Marshall saw the essential source of external economies in the commons –the pool of infrastructure, services and know-how from which each individual factory in the district might draw.

Marshallian external effects are connected with Adam Smith's idea of the positive effects of differentiation through increased scale and the division of labour in markets. It is important to observe that Marshall used his concept of external economies in a dynamic way, in which learning effects in non-market relations were very important (Lambooy, 2000, p. 29). In later studies of the neo-classical school, this dynamic aspect disappeared. In the 1940s and 1950s economists came to make a clear distinction between those technological *external* economies –pure spillovers– and pecuniary externalities mediated through the market (Scitovsky, 1963). Only recently economists like Krugman (1995) rediscovered such dynamism, pointing out that Marshall did not make this distinction. He lumped together the ability of a large local market to support efficient-scale suppliers of intermediate inputs, the advantages of a thick labour market, and the information exchange that takes place when firms in the same industry cluster together –two pecuniary externalities, and technological one. In the light of current theory, of course, he was right doing so.

On the phenomenon of agglomeration economies, Marshall emphasises the advantages for entrepreneurs of similar industries or trades of being located within the same region (what is currently called 'localisation economies'). He explains the existence of clusters referring to three types of *positive externalities* within agglomerations of interrelated firms: i) *knowledge spillovers* between firms, ii) *specialised inputs and services* from supporting industries, and iii) *geographically pooled labour market for specialised skills* (PE: 271). His cluster hypothesis basically states the existence of *dynamic complementarity* within a system of interdependent economic entities that influence specialisation pattern in production (Peneder, 2001, pp. 141-2). Therefore, a cluster of individual complexes as a whole is expected to perform better than the sum of its individual units in the case of a more scattered distribution. It should be noted that this idea considerably extended conventional economic wisdom, which relied solely on exogenous *comparative advantages* or *internal economies of scale*, respectively, to explain specialisation and concentration of economic activities.

But the analysis is not finished at that point, and gives equal weight to two crucial economic causes that work against too highly specialised industrial locations: iv) *differentiated skills* within the local labour market also call for a certain spread of skill requirements and associated sectoral structures (PE: 272); finally, a differentiated sectoral composition within a location also offers (v) a greater *spread of risks* associated with exogenous shifts in demand or input prices which are specific to individual industries (PE: 272).

Callejón (1995, p. 76) points out to similar conditions: i) supply of all factors of production; ii) a stable pooled labour market; skilled workers all over the area; iii) a quick diffusion of knowledge on innovations (*technological spillovers*). Those are the features making the difference with a *productive specialisation area* (firms embracing the whole productive process) which includes only that second group of economies (a pooled labour market for skilled workers) though they are the breeding ground of both. In short, higher efficiency sharing the information and skills diffused in all ranks of society.

It is important to keep in mind that Marshall does not predict complete specialisation of industrial locations. Instead a mixed composition of output across a broader range of activities in combination with a strong focus in some particular industries is more typical. In his model, increasing returns for the industrial sector and decreasing returns at the plant level coexist: "we must distinguish the economics of a whole industry and of an individual firm" (PE: 457). The industrial sector can find its equilibrium while the individual firms are in different positions in the growth's race: "as the leaves of a tree grow to maturity, reach equilibrium, and decay many times, while the tree is steadily growing upwards year by year" (PE: 457). In short, "the economies of production on a large scale can seldom be allocated exactly to any one industry: they are in great measure attached to groups, often large groups, of correlated industries" (IT: 18).

The appeal of Marshall's increasing returns was to combine his adherence to the theory of competence and to depart from the convexity's premises, which prevent growth. They explain the advantages of a local small industry over its competitors: a) lower costs of the productive process, because of the disposability and quality of local resources; b) less tangible actives linked to the regional culture and entrepreneurial history which constitute a collective good for localised firms in this area.

If we only permit increasing returns entering into the model, the analytical problem is that it reduces the influence of the Marshallian theory about external economies in literature on economics (Callejón, 1995, p. 77). Young (1928), Arrow (1962), Romer (1986), Krugman (1991) and Buchanan (1995) perceived all along the problem. Krugman's focus (1991, p. 38) emphasises the importance of agglomeration effects, so that economic integration and convergence are not necessarily united. Although explicitly presenting it as a formal treatment of Marshall's hypothesis, Krugman did not consider different industries but assumed all firms relying on the same labour pool. Focusing only on the phenomenon of agglomeration in geographic space, however, sectoral specialisation (that is the second essential feature of Marshall's hypothesis) remained unexplained. The focus on a different explanation of Marshallian district formation based on the vertical demand linkages between plants.

Various clues as to his opinions about vertical integration can also be obtained from his discussion of internal and external economies. The objective of Marshall's study was to settle "how far the economies of production on a large scale must be *internal*, and how far they can be *external*" (PE: 277). The way to obtain it was not clear. For only those organisations capable of fully benefiting of internal and external economies survives and develops (p. 264-5). His historical erudition taught him that things had not been always the same. In Petty's times, for example, "each single business was on a small scale; and though it had access to many of the economies of production on a large scale, these were *external* to it, and common to the whole district" (IT: 167). Later on (1890) he asserted that "external economies are constantly growing in importance relatively to internal ones in all matters of trade-knowledge: newspapers, and trade and technical publications of all kinds are … bringing him much of the knowledge he wants – knowledge which a little while ago would have been beyond the reach" (PE: 284). Thirty years later, the landscape has changed due to improvements in the capital market, machinery and transport: "the importance of internal economies has increased steadily and fast; while some of the old external economies have declined in importance" (IT: 167).

The problem for Marshall, and for post-Marshallians, is to combine learning and knowledge consequences of free competition in order to maintain progress through continual generation of internal and external economies (Hinch, 2000, p. 383). "Progress, made anywhere, quickly becomes the basis of new advances everywhere" (IT: 609). This is the well-known question of limits to the size of the firm and comes about because "the part which nature plays in production shows a tendency to diminishing return, the part played by man shows a tendency to increasing returns" (PE: 318). Free competition is the guarantor of society-wide economic welfare. It may be preserved if external economies dominate internal economies, if knowledge spreads through an industry in the manner of an invisible college.

Internal and external economies allow unit costs to fall into the long run when production is undertaken at larger volumes, they are "dependent on the general development of the industry" (IT: 167), what means that, if maintained, the expected outcome will be a monopoly: "he might then gather into his hands the whole volume of production in his brand of trade of his district … extend this district very wide, and attain something like a limited monopoly" (PE: 286). A monopoly is limited by the consideration that a high price would bring rival producers into the field. Changes in the scale of production in supply are the general form of long-run adjustment. "Business connections" (IT: 246) provide a "limited monopoly".

Marshall prevents against "such associations, so long as it remains true to its avowed design, is wholly constructive … without conspiracies to monopolise a particular branch of industry or trade", because "the experience … shows that they are in danger of being turned to destructive ends" (PE: 286). He denounces this practice in a number of plants, *e.g.*, "*Coats* refuse to supply any dealer who gives the competitors the chance to obtaine a place in the market; and this action

seems to infringe the spirit of the Common Law, which prohibits the entrance to the highway of business from being blocked by a giant aggregation" (IT: 597). Nowadays, firms like Microsoft seem to bear a resemblance because also "it makes use of a modified form of that 'tying clause', which has been an evil weapon of monopolistic power in America".

As many economists of his time, Marshall consider neither big firms nor State policies as a potential brake to economic progress. Those advantages would vanish, soon or later, through competence; so, he appeals to a discrete "intervention of public authority in case an association should develop anti-social tendencies" (IT: 101). "For if public assistance is given to a private corporation in acquiring special knowledge, which has a high pecuniary value, some provision must be made for securing that all, who desire it, shall obtain access to that knowledge on reasonable conditions" (IT: 608-9). Business strategy becomes important if there is a degree of monopoly (Hinch, 2000, p. 380). Marshall argues that despite the fact that competition and monopolies are separate ideal types, "in practice they shade into one another by imperceptible degrees" (PE: 397).

But, as he showed, increasing returns do not lead inexorably to monopoly (Cournot's dilemma) due to the 'life cycle theory' of the man that has had "originality, versatility and power of imitation, perseverance, tact and good luck for very many years" (PE: 285), but begins to lose it and is forced to "hand over his business to a successor almost as energetic as himself" (PE: 286). Stigler (1951, p. 185-93) applies this theory to the life-cycle effects working on firms: with the expansion of industry, the factory is able to increase its degree of specialisation, it will abandon certain productive processes and new firms will take them over; it is the explanation of disintegration as industry grows. Marshall sees as no compatible "increased internal economies by a great increase of his output … and to market this output easily" (PE: 286).

Being a big consumer of raw materials, districts concentrate a large number of specialised buyers. Though it is not a mere sharing of resources, the classical concept of external economies (common acquisition of raw materials, or the use of the same structure). Economies of concentration arise purchasing big quantities of inputs at low cost: "it buys in great quantities and therefore cheaply; it pays low freights and save on carriage in many ways, particularly if it has a railway siding" (PE: 282); firms in a district can press to suppliers, and give better guaranties to middlemen because of the variety of their products. Also, when "the number of middlemen is in excess of the real requirements of their work … none can apply the remedy as an association of producers" (IT: 610). The consequence is "a lowering of tariffs or of freights for the transport of goods" (PE: 273). Marshall refers to the example of the *Bradford Dyers' Association*: "that of saving cross freights by directing each customer to the factory most suitable for his purpose" (IT: 605). Even, links with raw material's markets could be used to buy a part of the produced goods.

To keep up the innovative potential of the network, it is important to maintain an open culture. Each member of the district must be given by the freedom to develop its proper relations with other partners from outside the network (Schumann, 2001, p. 50). Actually, it is a distinctive feature of the districts' relation to the market, at home and abroad; for this reason, "a large country has advantages for the development of industrial districts in which … concentrated specialisation is now carried to its highest extent: and such districts have generally a better approach to their own large markets than the industrial districts of a small country can have entry to foreign markets" (IT: 26); they constantly altered the goods, partly in response to changing tastes, partly to change tastes of consumers.

These markets are always national or international: "opportunities offered by the opening out of unknown Continents and of new communications between old Continents" (IT: 360). The production covers both local and global needs. For "its home trade is very much smaller than its foreign trade" (IT: 596), the external image is crucial: the geographical dimension of supply ('cutlery of Sheffield' or 'steel of Solingen') becomes object of choice (Trullén, 1990, p. 154). A connected problem is that of trade-marks and patent rights which relates to a more general issue, namely, to guarantee that the income from the introduction of an innovation (a new product, a novel design or a new method of production) is ascribed to the innovating entrepreneur.

As Brusco (1986, p. 187) points out, often it is a direct market in the sense that many firms, although they are small (fewer than 20 employees; in Sheffield an average of 5-6 workers per establishment), have direct relations with the markets of the finished product. It can be seen

that they are small only in name; in practice, they subcontract many stages of production (for example grinding work) to other plants so that the labour-force they mobilise is ten times greater. The subcontracting company only focuses on its core business and sub-contracts all the rest of its activity. Many of the home-workers were in fact 'little masters'. In other cases, these firms reach the national market indirectly through the work they carry out for parent-firms.

It is just the opening of international markets for the firms, leaving local perspectives, what speed up the creation of industrial districts: "the opening up of large markets in new countries gave a great stimulus to the movement, both directly and through its influence on the localisation of industry, that is, the concentration of particular branches of production in certain localities" (PE: 746). *Firth Steel Works*, a Sheffield-based firm, is a good example: from the very beginning it had its own aggressive selling organisation. Thus, at an early stage a profitable export trade was opened up with America, the Continent and Russia (Magnusson, 1994, p. 81). Indeed, within ten years of starting this firm (1842) had agencies in New York, Boston, Philadelphia, Montreal, St. Petersburg, Brussels, Copenhagen, Berlin, Melbourne and London. This combination of selling their own products together with wares manufactured elsewhere continued over the years. The inverse relation could be seen in Manchester due "to the instantaneous transmission of foreign demand through Manchester foreign houses with ramified connections in the countries to which they related" (IT: 286n).

When "the difficulties of marketing" (PE: 457) are great, the firm must look for its own niche if it wants to succeed, "is confined to its own particular market" (PE: 458) inside the district for the lack of external connections. But "markets are now united by so many connections, that a need for any common product almost anywhere can be filled in a couple of days, if not in a few hours, from a large reservoir" (IT: 251). Division of labour broadens the field: "a large open market effects an automatic distribution of tasks to those establishments which are severally best fitted for them" (IT: 174).

What he is speaking about is that a more efficient postal system and the presence of more economic contents in the media, diminished information and transaction costs in the market; and also, the revolution in transport and communications is carried out by the railways, telegraph and steamers which helped to develop the modern enterprise. "The new age gives ever increasing opportunities to the businessman to strengthen his enterprise in making good use of information, which is generally accessible … the multitudinous knowledge, which modern resources place at the disposal of those who seek them rightly" (IT: 360-1).

It is paradoxical (Trullén, 1990, p. 162) to recognise that good transport links are a requisite for recovering the conditions that Marshall described for the development of districts. Actually, the revolution in transport in the second half of the 19th century ("by 1870 England had built about two-thirds of her present railways … joined every important centre of industry with every other" (IT: 89)) was the pivotal argument to explain the process of industrial concentration ("the influence of improved means of communication on the geographical distribution of industries … tends to concentrate particular industries in special localities" (PE: 273)), restricting regional monopolies and giving new scope to national monopoly. "The leadership which England obtained in the service of railways was a chief contributory cause to the relatively luxurious life of the artisans of her cities and industrial districts in the middle of the last century" (IT: 804).

Marshall does not refer exclusively to reductions in transport's costs, in the type Weberian's agglomerations. Actually, a fact "that delayed England's rise to leadership were that her industries were neither concentrated, nor united by good communications" (IT: 28). The remoteness of Sheffield provides a good example: surrounded by hills and barren moors, was hard to reach by land and an often-flooded Don valley made communication difficult also along the river valley (Magnusson, 1994, p. 45-6). On the other hand, the city had an obvious advantage: it was amply provided with raw material such as iron, coal, wood and charcoal, as well as water-power.

3. Social Cohesion

Industrial districts constitute a specific kind of industrial organisation where factories and the surrounding social fabrics represent a unique entity, so that they cannot be understood sepa-

rately. The district's characteristic feature is the interweaving and synergy between productive activity and ordinary life (Trullén, 1990, p. 153). Marshall stressed socio-cultural relations that convert the productive machine into a positive pooling system, based on a shared language and ethical code as district's common heritage. This ability can be developed only if there is a certain social and cultural coherence in the region and sets of common aims and conventions (routines) directing socio-economic behaviour (Boekema, 2000, p. 41). The common aims cover a wide range of interrelated fields, reflecting the multi-faceted nature and setting of learning networks, e.g., ranging from culture and education to the labour and housing market.

There is a set of linkages which either directly or indirectly connects every member in a social group, "a world of producers, worked in the interest of the whole community" (IT: 660). What holds together the firms which make up the industrial district … is a complex and tangled web of external economies and diseconomies, of joint and associated costs, of historical and cultural vestiges, which envelops both inter-firm and interpersonal relations … a localised 'thickening' … which is reasonably stable over time (Becattini, 1989, p. 132). Because "no one is so wise as all the world; and no single business is as powerful as the whole industry to which it belongs" (IT: 174), the unity of purpose among the district's members gives them its force: "the moral coherence … and strength of the business depend largely on the growth of an *esprit de corps*" (IT: 326).

Industrial districts naturally emerge as co-ordinating mechanisms by diffusing competence, in the form of best-practice techniques, by standardising language and culture to reduce communication costs, and by encouraging honesty between members: "it makes each of them averse to any shirking of work" (PE: 305). We identify four main linkages connecting one person with another one in the district: i) shared identity signals (ethics, language, culture, common history); ii) trust as an attachment for its cohesion; iii) prestige as personal credentials in front of public opinion; and, iv) the role of education in all levels.

i) The development of non-commercial sectors like health care, housing, public services and nutrition fosters business districts. Social groups that support it include family, church, school, university, military service, trade unions, and clubs, among other. The creation of a *corpus* of rules and institutions also embraces what political ideology is in place ("their political and economic institutions have grown side by side in harmony" (IT: 35)) and the role of local authorities helping to create the conditions of consensus around the industrial structure: "growth had been favoured … by their social and political institutions" (PE: 270). Districts are rooted in the region, which points to local authorities and supporting organisations as participants.

Marshall highlights the social aspects of districts when speaking of old experiences of "working-class districts" –as the weavers of Rochdale– he declares that "their social faith could hold them together in business, and their business would give material strength to their faiths" (IT: 290), and praises the creation of regional institutions that balanced co-operation and competition among firms. In the cutlery industry at Sheffield, the workforce to a large extent kept up many of the old rites and customs and thus preserved an industrial structure that became increasingly obsolete. From the records of the *Pen and Pocket Blade Forgers Protection Society* we can learn that all employers within this trade who required workmen had to apply to the secretary in the union before taking on new men. This practice –the unions as a labour exchange– served as a powerful restrictive devise against bad employers. Though such a craft control eventuated in a strong opposition towards modernisation.

The social acceptance of the district's firm is necessary for all decisions. Furthermore, taking part in the process ("all its members vote on its main problems" (IT: 658)) is seen as an advance, in contrast to big factories where only a minority takes the crucial decisions, on the basis of rough reckoning which are incomprehensible to the workers who are neither consulted nor their interests, demands and expectations taken into account. While competing, collaboration is reinforced inside the firms and among them: such social feature should not be equated either with cooperativism – through their associative activities the co-operative movement provides an important source of Marshallian external economies – or with the structuralist character of neo-classical economics.

Sustantive knowledge is widespread among the participants: "the co-operative dissemination throughout all members of information as to improved methods, and even distinct inventions,

that have been worked out by any of its members" (IT: 606). This provides a strong incentive to maintain direct channels of communication, even though the cost, in terms of the time that is devoted to socialising, may be high. It is the flow of information needed to co-ordinate the flow of resources, which is crucial. Networking is therefore about establishing linkages in order to acquire strategic resources for learning, such as human capital and finance for R&D, and information on the external environment (Boekema, 2000, p. 42). Active districts undertake activities such R&D, or simply working together and learning-by-doing.

The use of a language ("they speak his own language" (IT: 151)) and a common method of signalling make it easier the fluency in everyday relations; which, in turn, reflects on the kind of education provided, on the health system, on the local or regional legislation, and on the organisations which echoe the views of SMEs nets, such as the *Bradford Dyers*, the *Calico Printers*, the *Cable Makers* or the *Sheffield Cutlery Trades' Technical Society* (IT: 604-7). Decision-making is a product of language, necessarily a social process. Marshall gives a special role to the "Chambers of Commerce, especially such as represent the homes of definitively localised industries" (IT: 612).

Establishing rules to guide firms' individual actions was not a novelty in economics, but it was its application to the internal and external organisation of the plant. Long-term responsibility based upon established 'shared network norms' of mutual responsibility enables the inter-firm flow of ideas as well as material orders (Best, 1990, p. 16). Game theory applied to industrial organisation: as people learn along the time, reiterative games lead in the long run to co-operation (Pareto-optimum). For instance, Sheffield shared a culture which was less penetrable and manipulable from above and that they to a large extent controlled their daily life and encounters as well as their work through institutions (Magnusson, 1994, pp. 59-60). Shared norms among craftsmen also admitted flexibility and adaptiveness: it is a *mélange* that they constantly multiply, collide, and transform each other, the normative authority itself is multiple and recurrently changes hands, strengthening and becoming diffuse.

Hayek pointed out that people also make use of inarticulate knowledge, perhaps derived from the experience of many years within a particular industry, which enables them to make sense of all the many bits of information available to them. This occurs with economies derived from improvements in district's organisation: "it took part … in developing (external) economies of general organisation, which gradually became common property" (IT: 315). But 'cultural knowledge' is not just a list of rules one holds inside one's head: "the nation is beginning to recognise that mere accumulation of knowledge stunts rather than educates the mind" (IT: 96). Rather, culture provides a framework of meaning that allows entrepreneurs to make sense of all the various, often conflicting pieces of information. Culture gives shape to the interpretative process that is entrepreneurship (Lavoie, 2000, p. 73). It is not a mere stick to the rules.

ii) The essence of a district is that the different members trust each other. Consensus among the actors involved can be reached. Trust gives cohesion to the whole system: "sharp verbal inquiries" are not needed (IT: 324). This is where they have the most to learn, though "discipline is enforced in great measure automatically 'by an unseen hand" (IT: 660). Trust is one of the most important 'ingredients' of entrepreneurial co-operation: "the trust, esteem and affection of his staff are a valuable asset, of a kind which his machinery cannot supply" (IT: 351), it spreads around the area. Moral incentives: morality can create a climate of trust. A net linkage is one that relies on a trust between the parties sustained by moral incentives. "He must have a power of first choosing his assistants rightly and then trusting them fully; of interesting them in the business and of getting them to trust him, so as to bring out whatever enterprise and power of origination there is in them; while he himself exercises a general control over everything, and preserves order and unity in the main plan of the business" (PE: 297). Trust between two market players facilitates negotiations and increases the quality of the contract. It influences the transaction "atmosphere" positive.

Trust is naturally stronger within small groups than in large ones because the frequency of face-to-face meetings between members is greater. It is an inherited asset from craftsman production trends where "business trust and confidence were indeed enforced within each group by the social penalty of ostracism: an offender against his neighbours became an outcast" (IT: 164). All actors must always maintain a neutral independent position to be accepted as a partner. At the same time,

SMEs in the district are constantly renegotiating formal and informal arrangements with one another, are 'changing partners'. This of course puts yet another strain on the need for trust.

Trust is built up over a period of time, through continual contracting and re-contracting, through informal deal-making, through one firm or group's offering assistance to one another in moments of stress, through mutual reinforcement in responding to contingency (Harrison, 1991, p. 477). Such trust emanates and reproduces from *experience*. It can be built through learning about the idiosyncrasies of the actors, and if this requires repeated interaction is likely to be facilitated by personal contact, and that contact is in turn enhanced by geographical proximity. In 1875, Marshall noted to his surprise that informal price discrimination was widespread in America. He ascribed the persistence of this "barbarous" custom to the extreme mobility of the American shopkeeper (Casson, 2000, p. 115). The implication is that because the American shopkeeper was always planning to move on, he did not invest in local goodwill, and so treated every transaction as an opportunity to get as much money for his goods as he possibly can.

The externality associated with "face-to-face" communication (mainly, among suppliers and users of the firms' intermediate products) favours a waterfall's spreading of technical and administrative achievements, increasing the system's global efficiency. That 'relation' reaches its utmost benefits in the interaction between innovator and user of the innovation. Proximity enhances the exchange of information on which individual decision-makers may then act. It makes information available, which might not have been exchanged in the absence of proximity. Reducing the incentives to secrecy, districts facilitate the exploitation of knowledge as a public good: "it permeates all life, like the air we breathe: and its services are apt to be taken for granted and ignored … the atmosphere associated with confidence" (IT: 165). Each advance in new knowledge used to be private, but it should become public if any positive effect is to be reached.

This raises the interesting possibility that high-trust corporate cultures, which 'network' internally, may be better at networking externally too, because the strategies governing internal and external relations are then alike (Casson, 1997, p. 124). Conversely, firms that have low-trust corporate cultures may have difficulty taking part in inter-firm networks (industrial districts) because the principles of networking are not well-understood.

Strategic networks means a long-term, purposeful arrangements among distinct but related organisations that allow those firms to gain or sustain competitive advantage vis-à-vis their competitors outside the network (Jarillo, 1993, p. 6). From this point of view, firms do not only compete, but they can also co-operate to provide common services, to shape the rules of the market game and to shape complementary investment strategies. Neighbours firms are said to compete on quality and technique but less so on prices (Harrison, 1991, p. 477). Without trust, once firms have agreed to enter a relation, investment or hiring decisions may become a dead weight loss to the party that took the decision, contingent on the belief that the relation would proceed as planned.

iii) An internal ethical code limits the temptation of opportunism. The prospect of further trades controls dishonesty and encourages the investment in reputation mechanisms: "such part of his business connection as depends on personal trust in him and cannot be transferred as a part of his vendible good will" (PE: 55). Everyone knows the no-written fair play's code that gains public attention: "money is a more portable commodity than a high moral reputation … if he makes money but loses his reputation, he can pack up his money and make it help him to earn a new reputation among new surroundings" (EEW II: 364. To remain loyal, informal contracts are based on a handshake rather than a written agreement, informal ties that go beyond (deeper than) mere contracts: "prestige is what is even more essential to his [employer] power" (IT: 659).

Thus, market behaviour will reflect the specific social norms, institutions, value systems, and conventions of acceptable behaviour that have emerged in that cultural setting. One person's reputation provides the bases for accepting him/her as a partner or for doing business with him/her: "a partial specialisation of particular establishments in certain branches of the steel industry has long been in progress, partly under the influence of mutual understandings" (IT: 223). Reputation is a sort of moral stick and a way of giving incentives to workers: "approbation is a reward but not only; it is also a sympathy" (IT: 326). The same can be applied to firms: "*Coats*' well-earned repu-

tation for thorough and honest work has caused consumers to prefer its goods to others at equal prices" (IT: 597).

In contrast, free riders have incentives to cheat. For this reason many critical voices were raised in Sheffield against manufacturers who turned out knives, forks, etc., of cast steel while pretending they were still forged in accordance with the old manner of craft (Magnusson, 1994, p. 67). This had injurious repercussions for the industry as it spoiled its reputation for high quality, and may had led 'conscientious' manufacturers to become less interested in quality as this could not be used as a factor in competition. In a general sense, it might have implied fewer incentives to introduce innovations and, lastly, the decline of the industrial district model.

A fairness way (ethics of work) of doing business, of interchange, is put in place. Marketing means investment in reputation mechanisms. "It is expensive to acquire reputation … it is indeed seldom of much value, unless accompanied by capable and honourable dealing" (IT: 270). When industrial districts had a poor reputation for integrity goods had to be inspected before purchase; but when standards of integrity are high, goods can be traded by sample instead (IT: 270-1). Brands plus reputation are equal to good trade connections. "A trustworthy brand gives the maker a good connection, because it enables the retailer, who uses it, to get a good connection" (IT: 300). Marshall expounds the example of an American trader who was prepared to accept any good sold to his clients: "it was to be taken back, and the full money returned, unless there was reason to suppose that she had not acted in good faith: he reckoned that where he thus lost half a dollar in money, he would gain a dollar's worth of good will" (IT: 270).

Marshall notes an ethical preceding in the co-operative movement in what he was involved: "co-operation has a special charm for those in whose tempers the social element is stronger, and who desire not to separate themselves from their old comrades, but to work among them as their leaders; its aspirations does rest in great measure on ethical motives" (PE: 306). All district's participants (not only a majority) must accept a set of moral values, such as honesty, loyalty and hard work, which identify them as members of the group (Gallegati, 1992). 'Whom you know' is often more important than 'what you know'. So that, certain attitudes taken as anti-economic could not be considered in this way within a district; e.g., when an entrepreneur refuses to lower salaries out of loyalty to his employees, "governed by the desire to 'do what is right' while probably he could not get half that salary elsewhere" (PE: 626), or "by a generous unwillingness to part with old associates" (PE: 404).

The "industrial character" of a region may arise out of natural advantages but their exploitation "depends on his ideals of life, and how inextricably therefore the religious, political and economic threads are interwoven" (PE: 270). Emotional mechanisms that engineer network relations include respect (guilt and shame), honours, self-respect; social events (face-to-face contacts), communal relaxation, conversation; shared experiences (same military background). Internal factions are suppressed by focusing aggressive feelings on those outside the group (Casson, 1997, pp. 125-7). Entrepreneurs who normally compete over market share also see one another regularly, through their social clubs, churches and on the advisory boards of local co-operatives and regional agencies. "[They are] able to follow the religious worship of his fathers" (IT: 151). Such extracurricular social interchanges among managers provide the key to understanding why they might consider the companies in which they are employed as communities, and behave accordingly.

If everyone knows one another, it is easier to solve conflicts smoothly: the closer they are, the easier it is (Lorenz, 1988, p. 208). Marshall notes the role of trust in the wage determination process becuase formal collective bargaining sets only minimum pay scales and working conditions. Though strikes occur, it used to be shorter, and the resulting compromises between management and labour produce agreements in the district through the *Boards of Conciliation*: "delegates of employers and employed meet form time to time with the intention to speak with openness, each side trying to put itself into the point of view of the other side … they require a good deal of mutual knowledge and confidence on both sides" (Mem: 218). The incompleteness of these agreements is a desirable, intended, perhaps even necessary, part of the process.

A further jump cames with the Government *Whitley Report* that substantially adopts the 'Outlines of a settlement' which are set out in a *Memorandum on the industrial situation after the*

war, issued by the *Garton Foundation* in June, 1916 (IT: 393n). "It proposes that employers and employees shall discuss matters of common interest, first in *Works Committees* of individual factories, etc., and afterwards in *District Industrial Councils*, the members of which are elected by *Works Committees*; while still larger *National Councils* are to be elected by the *Local Council*. An organised joint direction of employers and employees. Such movements may be productive of great good to the particular industries, or groups of industries concerned" (IT: 393-4).

> *One of the main purposes of the Whitley Report is indeed to raise the status and develop the self-respect of the workman, by enabling him to form and express well-considered judgements in all aspects of the business in which he is employed, which specially affect him; and in a less degree on the general policy of the business, in so far as there is no need for keeping them private. In all these matters 'frank talk heals'; and, as the workman's knowledge and faculty expand, growing self-respect will give firmness and moderation to his policy (IT: 643).*

The osmosis between district's industrial organisation and its social network enhances the growth of a diffused 'public opinion' assuming the role of social controller and judge of the district's persons and firms: "the increase in the area from which public opinion collects itself, and in the force with which it bears directly upon economic issues" (Mem: 286). For the individual it is constituted and determined, to a certain degree, by the environment and social context in which s/he is born and grows up. It is worth quoting at some length two passages that appear in *Principles*:

> *To distinguish that which is chivalrous and noble from that which is not … is the first duty for economists … learning from businessmen. An endeavour should be made so to guide public opinion that it becomes an informal Court of Honour. Then wealth, however large, would be no passport to social success if got by chicanery, by manufactured news, by fraudulent dealing, or by malignant destruction of rivals; and that business enterprise which was noble in its aims and its methods, even if it did not bring with it a large fortune, would receive it through public admiration and gratitude … Wealth-getting by sordid means would not win its way in society, nor in popular favour; and no political committee, however devoid of high sentiment, would be short-sighted enough to follow a recent example in choosing a candidate who had been proved judicially to owe much of his wealth to base means. Sordid practices would then prevent wealth from yielding that social éclat (Mem: 342-3).*

Public opinion should help to revive those latent instincts:

> *Now there is a general agreement among thoughtful people, and especially among economists, that if society could award this honour, position and influence by methods less blind and less wasteful; and if it could at the same time maintain all that stimulus with the free enterprise of the strongest businessmen derives from present conditions, then the resources thus set free would open out to the mass new possibilities of a higher life, and of larger and more varied intellectual and artistic activities (Mem: 325).*

Credit gained through a good reputation opens district's doors: "the desire of men for the esteem of others is an economic force of the first order of importance, and that the strength of public opinion is steadily increasing with the diffusion of knowledge" (Mem: 285). This fact is related to the growing diffusion of knowledge so that "what had been regarded as private and personal issues to become public" (Mem: 285).

iv) Marshall highlights the role of education in the building up of successful districts. That means to assure sufficient investment in skills for learning and for management at different levels, and through formal as well as informal education (Boekema, 2000, p. 41). Technical training "for the higher ranks of industry" (PE: 209) should enhance the same qualities than the university education. Universities would continue "in detail special branches of knowledge for the benefit of particular trades" (PE: 209). Though the training and education of the workforce through the school system are more important technical schools (spread all over SMEs areas) gave the workers the basic theoretical elements of their trades. "Its is gradually to develop its own Research Institute: and it is to foster solid methods of education in the cotton districts. It is to be strictly 'co-operative', in that all will contribute for the general good" (IT: 608n).

This trend reduces the firm's resistance to invest in its employees' formation and increases the importance of education at the work-place. Given that "all important knowledge has long deep roots widely spread" (PE: 270), district's entrepreneurs realise that part of the new knowledge will go to a common pool and that workers coming from other district's firm also will bring with them this human capital which is a district's public good. Specialisation of workers does not get lost after switching from one firm to another because they stay within this environment. It is the opposite of segmentary work practices when plants train their employees in such a manner that their skills will be firm-specific, and therefore of little use to a competitor. As a result, the local communities accumulated managerial, technical and commercial competence and capacity: "their ancestors had profited by the traditional arts of earlier civilisations" (PE: 270). Imai recognised the similarity between the Marshallian "knowledge growth mechanism" and the mingling of co-operation and competence in many Japanese firms.

The district's value as an information net stems from workers undertaking elections and valuations: the higher the quality of knowledge available to decision-takers is the better they will prevent inefficiencies. External economies in the district hold on the role of knowledge as a competitive advantage, from which the firm profits for the very fact of being inside. The more experience and knowledge which have already accumulated along and close to a certain path of knowledge, the more efficient the firm becomes in interpreting and processing additional knowledge, which relates to its particular body of previously established knowledge (Peneder, 2001, p. 40). A broadly tacit knowledge based in expertise and learning by doing. Industrial districts can be defined as a system that creates knowledge and organises relations.

Tacit knowledge is rooted in practice and experience, and transmitted by apprenticeship and training through 'watching and doing' forms of learning, strongly coloured by the social and cultural setting (Boekema, 2000, p. 40). The common language makes easier the communication of knowledge than a mere demonstration of a machine functioning because "education by imitation began in early youth" (IT: 351). Less importance is given to technical handbooks or specialised courses, the unique comparative advantage is recognized to be in the long run knowledge. It activates a historical process of knowledge's sedimentation: "the son of a manufacturer profited by traditions as to things, methods and persons handed down to his father" (IT: 359). All participants benefit from this common property: "these associations are known as *pools*, because they pool some part of the interests of those concerned" (IT: 511). As the industry grew, a pool of specialised workers and technicians developed: "the modern age calls increasingly for the concentration of thought, as well as of plant, on relatively narrow ranges of thorough specialised work" (IT: 617). Because of its wholly personal-embodied nature, knowledge can be traded only through the labour market.

Learning is one of the most important capabilities of a society. This is true for firms, persons, organisations, institutions, regions and countries alike. Taking the firm as a 'learning organisation' and that knowledge depends to a certain extent on tacit components, embedded and bundled within individual experiences and skills, proximity –be it geographical, cultural or intellectual– raises to a considerable dimension of modern economic analysis (Peneder, 2001, p. 137). Proximity gives the firm more opportunities to absorb external economies of different kinds or to participate more generally in the common (public good like) elements of specialised 'pools of knowledge'. The Marshallian model incites firms to settle close to others operating within the same field of technological knowledge.

It is a distinctive feature of districts that knowledge is not a property of one particular group but that it is spreaded to all social strata: workers and engineers who grew and developed within the district. Over the years, knowing their business and the region's functioning by heart, they developed networks of business relations and informal contacts that favoured an enormous flow of information. Standardised, rigid relations between the district members are avoided.

Then, management of information is crucial: "the new age gives ever increasing opportunities to the business man to strengthen his enterprise in making good use of information, which is generally accessible, but yet cannot be turned into account without some mental effort; and if he does not avail himself of them, he must make way for more alert competitors … who have learnt

how to turn to account the multitudinous knowledge, which modern resources place at the disposal of those who seek them rightly" (IT: 360-1). Management of public stock of knowledge includes the updating of archives, libraries, etc., and provides access to them: "newspapers, and trade and technical publications are bringing him much of the knowledge he wants" (PE: 284).

Knowledge is situated at the heart of the productive process, although this idea has not been appreciated until recently (as a part of human capital), presumably because knowledge cannot be measured as can be costs and profits. Taken as an economic good, information faces serious problems of quality control: false information, failure of communication (language, culture), dishonesty. It needs to be filtered and adequately processed: the accumulation of productive knowledge resources generally exerts a strong tendency towards self-reinforcement.

Marshall proposed an apprenticeship system in conjunction with local colleges and supported 'on the job' training by collectively outlawing the poaching of staff. Scientific training that encourages the "practical instincts by direct experience in well-conductedly works and stimulates his mental activity (PE: 209). The practical impacts of the program – should they be successfully implemented – will be to contribute to the generation of Marshallian externalities. It was a project à la *Erasmus Program*: "a good plan is that of spending the six winter months of several years after leaving school in learning science in College, and the six summer months as pupil in large workshops. The present writer introduced this plan about forty years ago in Bristol" (PE: 209-10n). Furthermore, he suggests to spread methods of apprenticeship which were in place in several firms in England: design work at class and thereafter to the workshop (*Mather and Platt*), rotation at work (PE: 210). And aided the creation of schools for specific technical training: Leeds and Bradford (woollen industry); Clerkenwell (optics); Staffordshire (designs); Manchester (*School of Technology*); London (*Imperial College*) (IT: 609n).

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