

Spatial shifts and the emergence of innovative milieux: the case of the Jura region between 1960 and 1990

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Abstract. The idea of 'regional innovative milieux' allows us to understand how certain regional actors innovate and manage to create new industrial activities. After this idea has been made more precise, it can be applied to the case of the Jura region. This provides an interesting picture of the numerous industrial transformations of this region. Innovative milieux are compared with some other views about regional development. The implications of this view on the interactions between industry and space are discussed.

Since World War 2 and up to the end of the 1970s, industrial development in Europe and in the United States was mainly led and studied through sectoral dynamics. During this period, the increasing importance of economies of scale and standardisation led to a decline in product innovation and a great emphasis on process innovation (Kleinknecht, 1987). The process innovation being, of course, mainly related to sectoral and corporate dynamics, which were imposing their logic on spatial patterns. The spatial division of labour (Aydalot, 1976) is precisely a theory marking the primacy on economic space of industrial dynamics and large organisations. Changes were initiated inside industries and were then diffused through space, following a constant and passive functional and hierarchical logic from the centres to the peripheries.

In this context, the decline of traditionally developed centres and the emergence of new localised industrial activities raise important questions. The strange phenomenon economists face seems to be a renewed coincidence between the development of industrial activities and regional concentration. Historically, this is not a completely new phenomenon. During the industrial revolution, most manufacturing sectors developed on a regional basis in Great Britain (Hudson, 1989). Today, these concentrations seem to be closely related to uncertainty induced by shifts in product markets and techniques. Starting from this evidence, many economists and geographers began to investigate regions where 'something' was going on. Hundreds of case studies have been made and are still made in order to understand the (new?) relationships between industry and space. Anyone who is interested in these problems can find interesting elements to study just outside his or her front door! Nevertheless, at first sight, it is difficult to understand how industrial and regional dynamics interplay.

Most economists and geographers try to explain this phenomenon through Marshall's idea that agglomeration in space brings external economies (Becattini, 1990; Scott, 1988; Storper, 1991).¹ But obviously, these external economies, as they are no longer constituted by natural resources, do not fall from the sky. Therefore, the problem is in understanding on one hand the *autonomous creation of competitive advantages* and on the other hand the *link between this creation process and space*.

Since 1985, the GREMI (Groupe Européen de Recherche sur les Milieux Innovateurs) has worked on the hypothesis that *regional milieux generate innovation* (Aydalot, 1986; Aydalot and Keeble, 1988; Camagni, 1991; Maillat and Perrin, 1993; Maillat et al, 1993c). In other words, the development of certain successful

regions would be driven by their autonomous ability to create new products, techniques, and organisations. This paper is a reassessment of several empirical and theoretical studies (Crevoisier, 1993; Crevoisier et al, 1991; Maillat et al, 1993a; 1993b). I develop the idea of regional innovative milieux and show how such milieux emerged and shaped the development of the Swiss region of the Jura. In the first part I will describe what is intended by an innovative milieu, and how such a milieu can innovate and give birth to autonomous development. In the second part I will show how this representation highlights the recent history of the Jura region. Several ruptures in behaviours and in the industrial structure pushed (allowed?) regional actors to react through collective decentralised networks. Obviously, there are several sectors or subsectors that have not responded in such a way. Barriers and a lack of regional cooperation or hierarchical structures have sometimes prevented or constrained the development of regional milieux. In the third and final part of this paper I will make some conclusions and suggestions about the understanding of industrial development and the evolution of economic space.

Regional innovative milieux

The aim here is to build an operational representation of an innovative milieu. Many aspects could be discussed further. Interested readers can find more precision in another paper (Crevoisier, 1993). The idea is to show how the concept of an innovative milieu highlights the evolution of a concrete region. Therefore, the interesting aspect of such a representation has to be appreciated by its ability to explain reality.

For twenty years now, we have lived in an era marked by unforeseeable shifts in techniques and in product markets. When techniques and markets change quickly, some 'windows' open, which become opportunities for local actors to challenge established persons, firms, and, by implication, industrial activities and spatial hierarchies. The main idea developed here is that during such historical periods, microprocesses, the action of small groups of professionals, become a central element for the global recomposition of industrial activities. The story goes that electronics began in Californian garages. Is this just a journalistic assertion or does it make any economic sense? If such processes had not taken place, the industrial and spatial outcomes would certainly have been different.

Another point to note is how innovation can transform economic structures. Changes in the 'hard' material and organisational part of economic activity has first to be mastered by human intellect, which up to now has been the only source for the creation of new forms. Therefore, innovative milieux will be described here at the level of 'intellectual' capacities of regional actors, mainly *know-how* (Crevoisier et al, 1991) and *project-building capabilities*.

The first of these intellectual capacities is the regional capacity to develop autonomously a know-how which allows for the *specialisation* of the milieu, a *differentiation*. Successful regions always have *specificities*, the mastering of one or several particular techniques (such as integrated circuits, micromechanics, and plastic injection) or the mastering of design-intensive products (such as shoes, clothes, watches, and glasses). In comparison with other spaces, these internally created specificities are also the competitive advantages when compared with what exists in other spaces. Know-how is clearly intended here as a human-related capability. Therefore, when individuals develop a new know-how, they simultaneously appropriate it. By implication, this also becomes a resource for the related firms and space. Know-how constitution and implementation creates differences between spaces, and this specific know-how could be in the form of advanced technical

skills, manual skills, specific design abilities, or simply knowledge relating to a specific industrial sector. The idea is that there are differences between spaces at the 'software' level; that is to say, the specific contents of the know-how of the labour force. In other words, the kind of production structure to which this know-how is related is not as important as the fact that a pool of know-how develops and is implemented.

The second process which occurs at the software level in innovative milieux is the capacity to build innovative projects. Here, attitudes, identities, and so on play an important role. Many of the regions which have had problems during the last twenty years had important know-how, as well as training and research facilities. However, they could not transform them because of socioorganisational barriers, attitudes towards new technologies, and so on. Obviously, both these aspects—project building and know-how development—are indispensable and interdependent in an achieved innovation process. When regional actors build a new project, they take into account the resources that can be mobilised and at the same time the opportunities in the technical and market environment. This allows them to develop their know-how in a certain direction.

A milieu is defined as *a set of localised actors who, through frequentation, or through the simple fact of living in the same region, have a mutual professional regard. Starting from this and close or complementary know-how they develop a convergent representation of constraints and opportunities which appear in the technical and market environment, and they develop together and in an interdependent way their know-how and the professional rules which accompany it.* To make this clearer, let us look at how innovation is produced in such environments. Please note that such milieux do not correspond to a geographical area, but *proximity* between regional—or local—actors is a determining link. Therefore, a region can be the home of several milieux, as in the case of the Jura region.

Innovation processes have in fact two stages (Maillat et al, 1993a; 1993b). First is a *project-building phase*, during which one or several actors look to their resources and to the resources they can mobilise in their surroundings, and put this perception into relation with constraints and opportunities which appear in the more general technical and market environment. In other words, small machine-tool makers, considering their skills and machinery, and perceiving the development of electronics

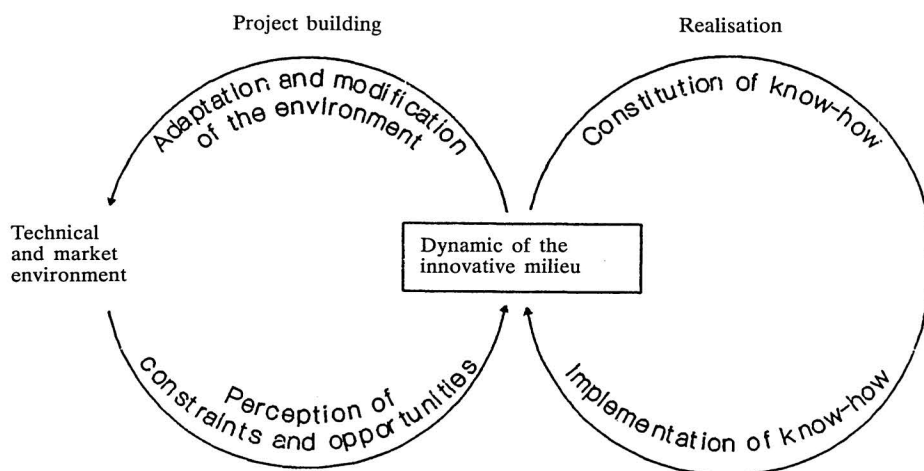


Figure 1. The regional innovative milieu: an autonomous set of interrelated processes in an environment (source: Crevoisier, 1993).

and computer science, will—perhaps—develop a project or an idea in which they try to use these new techniques (opportunities) in order to exploit better their own resources. The *realisation phase* then follows, and consists of developing the know-how which is necessary for implementation of the project, and after that or simultaneously, for transforming the material and industrial reality. However, this second phase leads the involved actors to a new situation. They have developed new know-how, new resources, and they have built new production abilities. This opens further project-building opportunities. Surveys show that most innovation projects lead to new ones, involving more or less the same actors (Maillat et al, 1993c). This closed circularity of project building, leading to implementation, which then leads to new projects, and so on, shows how *autonomous regional dynamics* develop (figure 1).

This representation of a regional innovative milieu would need more discussion. However, I have chosen here to illustrate this approach with the observed main transformations of the Jura region's industry during the last thirty years.

The transformation of the industry of the Jura region

The Jura region is an old industrialised area. Traditionally, small and medium-sized firms constitute the bulk of the industrial system, but there are also some large firms, generally articulated to the smaller ones. This diversified system cannot be unambiguously classified as a small-firm area, as for most Italian industrial districts. This feature is interesting because it requires us to look at the ongoing process in the region rather than just rely on traditional explanations about the flexibility of the small-firm system versus the rigidity of large organisations. In this case, size is not as important as the development of transorganisational processes in this region, or, in less successful cases, as blockages which prevent different organisations from cooperating. Between 1960 and 1990, the industry of the Jura region shifted from a rigid and hierarchical structure to a multidirectional evolving system. The system has even evolved further, as some recompositions have already occurred on these decentralised processes, namely in the manufacturing of quartz modules for watches. In the following paragraphs I describe the shifts in techniques and products; that is to say, the innovations concerned. Then, for each case, the parts of these transformations which were realised by regional professional milieux, and the parts due to corporate top-down strategies will be distinguished.

The hierarchical logic in the watch-making and machine-tool industries up to 1975

Since 1950 and until 1975, the industrial system of the Jura region became more and more rigidly organised. This could be observed by a shift in concentration at the end of the 1960s, but above all by the fast standardisation, the increase of mechanisation, and by a sharp decline in the qualifications of the work force. In the watch industry, intermediate markets between firms also became very competitive and one centime was the difference which could make or lose a sale. The largest firms in the region had a quasimonopoly on the manufacturing of the watch movement. Firms were therefore rigidly positioned between an increasing standardisation and a tough market. During that period, there were changes which exclusively affected the production process. Products and their related techniques remained stable for thirty years. The development of mass production was the dominating movement. Therefore, products became more and more standardised, the division of labour between and inside firms was pushed further and further and competition in and outside the region became tougher with the emergence of new competitors. The top-down division of labour ran from the top of the industry down to individual labour posts, the latter being defined more and more narrowly, needing just some

very simple gesture to accomplish. Wages were nearly always calculated on the basis of *individual productivity*. Therefore, differences between individuals were large and, obviously, no cooperation would occur between them. The basic indispensable know-how was strictly on an individual basis and was mainly transmitted by the workshop foreman to newcomers. Between firms, we could find a similar pattern, in the sense that the division of labour was rigid. There were firms which specialised in just one process, such as those assembling jewels on their metallic support. Markets of intermediate goods were very competitive. The global *upstream-downstream organisation* was imposing more and more its organisation and barriers between firms and individuals down to the shop floor, simplifying and automating many tasks. The average qualification of the work force went down sharply. The productivity of this top-down structure was very high and the region was one of the richest in Switzerland during this period. However, at the beginning of the 1970s, when a need to change the basic technology occurred, this hyperspecialised and *locked-in* structure lost most of its know-how in order to find new products and simply could not change. A large part of the system collapsed around 1975.

The innovative milieu of the quartz watch from the beginning of the 1960s

At the beginning of the 1960s, several people from industrial organisations, companies, research institutions, and local authorities decided to begin researching in the field of quartz techniques. The initiative of these researches was both collective and diffuse, and the starting point was a clear perception that the basic properties of watches—especially accuracy—could be affected by the emergence of electronics. This research was led and financed in a decentralised manner, even though the Centre Electronique Horloger played a predominant role. There were cooperative laboratories but several firms also had a research team working especially in the timing of sport competitions. The involved technicians were meeting at least once a year at the competition of the Observatory of Neuchâtel. The spirit of these meetings was cooperative, and it was almost the only place in the region where such interactions were occurring at that time. In 1967 the quartz watch was invented. The technicians dispersed into firms, many of which were small firms launched at that time to exploit this novelty. The components were bought onto the market, mainly by US firms.

In 1975, the recession and the emergence of strong new competitors from Southeast Asia pushed the largest firms of the region to build their own factories to produce electronic components. The reason was that in the mid-1970s, electronic techniques were indicating better prospects for automation than were mechanical techniques. In order to implement this, the companies mobilised the technicians previously involved in research and bought production equipment from the United States. The creation of new factories in this field was due to these engineers and others who had previously emigrated and were working in US electronic firms. They were called back and hired by these companies. It is important to note that this remarkable technological transfer could occur thanks to the existing know-how links with US firms.

From a regional point of view, the two large firms who built these factories have *internalised* the new techniques. When these techniques became adequately stable, around 1980, a standardisation and automation process began. Large amounts of capital were invested and the production of electronic modules became an oligopolistic, large-scale activity. Today, the latest European firm to produce these modules has made commercial agreements with Japanese watch manufacturers—who from now until the foreseeable future will be its only competitors. In this subsector, the top-down logic is again evident. The global organisation between producers has fixed who produces what and where. The French, German, and US watch industries

disappeared as a result of this process. The remaining competitors are those who began to prepare for these changes twenty years previously. In the Jura region, these processes intensely related to small-scale interactions between individuals and institutions of many types cooperating on a regional basis.

Persistence of top-down logic among traditional machine-tool manufacturers since 1975

In the watch industry, a large proportion of traditionally organised firms simply disappeared in 1975. The shock was such that old structures were completely destroyed. In the machine-tool industry, however, many firms persisted and therefore maintained their structure. The old hierarchical division of labour has simply been extended through new specialised departments to deal with new techniques, especially computer science and computer numerical controls. In response to falling demand for their products, these firms have developed ambitious systems specialised in only one application (for example, plastic injection moulds, car cylinder rectification, or ammunition), but the rapidly shifting markets are no longer broad enough to absorb this rigidly specialised production and the continuous changes in techniques require large investments to update products, investments which can no longer be amortised in these small-scale production processes.

The division of labour—and the remuneration system associated with it—prevents cooperation in the workshop, between the workshops and the design department, and of course between firms. This in turn prevents the creation of new products which gradually take into consideration the new needs of the market and up-to-date techniques. The result is a continuous problem of costs, a constant decrease in employment and profits, and the demotivation of an ageing work force. This hierarchical logic also prevents firms from cooperating on common problems, such as the development of numerical control, the design of flexible manufacturing systems, and so on. In 1985, twenty-five numerical controls were produced in this region, and today this production has nearly disappeared. A further example is the case where no less than seven firms along a stretch of road 80 kilometres long have invested huge amounts of money in developing rival flexible manufacturing systems. As a result, several of these firms are no longer operating.

The innovative milieu in the machine-tool industry since 1975

In the machine-tool industry, old firms have been declining for twenty years but many new innovative firms have emerged and the sector on the whole maintains its level of employment in the region. As in the microtechnology industry, most of the people participating in this milieu come from the watch industry. When firms collapsed these people became unemployed or faced jobs which no longer corresponded to their know-how. Many firms also switched from watch production to machine production. Since then, new products have been designed and produced through cooperative networks of firms specialised in a 'module' of a particular machine. Each of these networks builds a large range of systems, aimed at many different markets, in opposition to old manufacturers who produce complex systems providing everything specific clients require. Products are in fact mainly developed to solve customers' particular problems and simultaneously exploit the existing know-how. These machines are developed and produced at a reasonable price. Traditional vertically integrated manufacturers develop complex systems in order to master fully problems of automatisisation in one specialised industrial activity. These networks of firms shift easily from one sector to another. The companies also have a greater ability to deal with up-to-date technology than do traditional machine-tool manufacturers. The problem of this milieu is the difficulty in producing machines in either medium or large quantities.

The emergence of the microtechnology industry since the end of the 1970s

Microtechnology is characterised by the combination of several technologies, mainly micromechanics, microelectronics, optics, and material sciences. Cameras, sensors of any type, measuring devices, and medical apparatus such as endoscopes, are typical microtechnical products. For fifteen years now, microtechniques have been developing fast in the Jura region. The growing number of firms, training and research institutions, fairs, and so on have been made possible through intense cooperation between regional actors. This innovative milieu has emerged slowly, but occurred mainly around 1980. At that time, the technical transformation of the watch industry had finished. Many firms, research centres, and individuals who had developed skills in up-to-date technologies could no longer use this know-how in their jobs when the larger firms had internalised the now stable quartz technologies. Cooperation here is a major feature of innovation. The quickly moving techniques and markets of this industry imply intensive collaboration between firms, as none of them have all the equipment, know-how, or resources needed to develop and manufacture new products. Moreover, people who hold responsibility in this industry are very often the engineers who participated, more or less directly, in research on quartz technologies in the 1960s and 1970s. They know each other well, and as a result common innovative projects naturally emerge in this milieu. The main problem in this industry is its relative inability to develop large-scale production. Several trials have been made and expectations are usually unfulfilled. Nevertheless, it is an outstanding example of the emergence of a new industry on a regional basis.

The innovative milieu of design and marketing in the watch industry since 1980

At the beginning of the 1980s, the technical transition of the watch industry had finished. Nevertheless, a tough recession took place in 1982. Many firms disappeared at that time. Banks forced the large firms to merge, in order to save the investments which had been made in quartz-module production or for other purposes. However, another process took place at that time and pulled the whole industry out of the recession. It was again a very diffuse process. This time, an innovative milieu appeared, adding new properties to watches. Watches became more than devices that just gave the time. They became objects of social distinction. This was achieved mainly in two ways: first by the introduction of fashion, and second by the introduction of the 'jewel' watch and the element of exclusivity. These new properties represent by far the largest portion of the added value in today's Swiss watch production. In 1980, the Swiss share of the world watch production was 29% in quantity and 35% in value. In 1991 this share was down to 13% in quantity, but up to 53% in value, in what is an expanding world market. This success was reached through an important increase in the average price of Swiss watches. The opening of a new market remains the basic modality of industrial recompositions. The development of this know-how occurred as a result of several modalities. Specialised service firms appeared which work for several watch manufacturers. Watch-case producers opened design departments. Some 'hollow' corporations were initiated in order to develop and sell one particular model, subcontracting nearly all their operations. Many relationships occurred with well-known French and Italian fashion designers. In short, many actors were developing ideas and interacting. Of course, out of the vast number of trials and errors, relatively few models or model lines led to mass production.

Product changes are quick, decentralised, and have a clear collective component because everyone is aware of what others do, thereby defining products, marketing, design, and commercialisation techniques through an imitation/differentiation process.

A labour market therefore appeared in the region for people specialising in design, marketing, and commercialisation.

Towards a global explanation of spatial industrial dynamics

The innovative-milieux approach suggests that problems that have arisen since the 1970s in the understanding of the emergence of new activities and the unexpected development of certain regions should be tackled simultaneously. A detailed investigation of the Jura region confirms that regional dynamics, after a rupture, become an important catalyst for industrial recompositions. First I will describe how networks of professionals emerge in a region, and why proximity plays an important role. Second, a very global scheme will be suggested in order to consider these subjects. Finally, this global scheme will be viewed along with other authors' opinions on the subject.

The emergence of innovative milieux in a region

Cases studies which describe Italian industrial districts or high-tech regions all insist on the importance of the mobility of qualified labour in these areas. Professionals work for a couple of years in a firm and then change job when they feel they can no longer learn anything new. During this time, personal contact and collective learning occur within the firm. These rich experiences allow particular relationships, know-how, and cooperation rules between people to develop. When they go to another firm, professionals take with them their know-how *and* the relationships they have built in their previous job. Therefore, these resources and the resources related to their previous experiences become part of their milieu. This means that they gain easy access to many specific resources. When a problem arises or when an opportunity appears, they contact their ex-colleagues and ask them for a solution, or indicate an opportunity to them. Another way in which these links can be created is by people studying together. Here too, rich interactions occur and remain an excellent basis for further cooperation. This mobility also facilitates technical entrepreneurship, as someone who tries to develop a new firm already knows where and how to find complementary resources. In such professional clusters of people, professional ability and good work are rightly appreciated. This is a basic condition for know-how to develop. In the creation of professional relationships and know-how, spatial proximity plays an important role. First, the labour market is generally regional because of the interference between the workplace and home. Second, the training and research system of a region often develops via an interaction with the industrial activities of a region. Of course, these features are not *strictly* related to spatial proximity. We can imagine a broader mobility of qualified people; scientists, for example, who move easily from one place to another without losing their qualifications. But what about the mobility of sets of people with skills ranging from high to low and related to a specific set of activities? Know-how has a clear collective component. The question of the relationship between know-how and space needs more discussion. Here, I just suggest that spatial proximity makes mutual professional appreciation easier and more accurate. Such milieux could perhaps develop at other spatial scales, but the region is the most immediate level for such interactions and mobility of qualified labour to occur.

A single pattern of events in regional industrial dynamics?

When a rupture occurs in the industrial activities of a region, sectoral structures partially or totally collapse. At that moment, other relationships can become the catalyst. Professionals, who had previously developed know-how, do not vanish, and under certain conditions they may even increase the value of their know-how by developing or creating new activities rather than just by emigrating or by moving

to a completely different activity. Obviously, there is no determinism. Attitudes, identities, and historical features can play a crucial role. However, when networks of professionals begin to work, allowing project building and facilitating know-how development across established organisations, then a milieu occurs and innovative projects, related to learning dynamics, become self-fulfilling. Sometimes, radical innovations emerge, though this does not happen in one go. Several years of trials, research, adaptations, and improvements are necessary. It took fifteen years for quartz watches and more than ten years for the microtechnology to occur. During this period, small-scale production, shifting products and techniques, cooperation networks, and personal contacts take place and play a crucial role. Once things stabilise, a new sectorial dynamic may begin on a new basis and it becomes possible to invest in order to broaden the outlets and rationalise production.

Although these innovation processes can be described in general terms, they always have *specific* features. They are usually led by 'professionals' who collaborate to build projects and to learn collectively. These innovation projects obviously incorporate local constraints *from the start*, in particular the level of wages in the region, but also technical, social, and cultural constraints. Therefore, when trying to innovate, one of the firms' implicit aims and constraints is to generate an income compatible with local wages. In this case, firms cannot influence prices, as they usually sell their products on international markets, and they cannot influence the price of labour.

In juxtaposition with this, mature supraregional organisations dominate the relationships between spaces. They can organise production, research, and so on, linking several locations into a single set. Moreover, by doing so, they break the limits of a unique location with a unique level of wages. Innovation incentives are consequently very different. Established organisations tend to innovate in order to remain competitive in the marketplace and to exploit their past investments. Regional milieux will innovate in order to maintain a certain level of income.

In this broad scheme, Planque (1991) states that regional milieux seem to innovate in a *multifunctional* way. Mature industrial organisations are more likely to find solutions easily to well-defined problems, solutions which fit within the existing division of labour; for example, process innovations which are not related to changes in products. In innovative milieux, innovation comes 'out of the soup'. The division of labour fluctuates in relation to the project, the development of know-how, and constraints and opportunities which appear in the environment. These decentralised processes suit multidirectional trials better than planned research and development.

Regional innovative milieux and spatial shifts

Of the many approaches to new localised industrial activities, many economists tend to focus only on the idea of externalities (Becattini, 1990; Marshall, 1956; Scott, 1988; Storper, 1991). Nevertheless, *very few try to explain how externalities are created*. In the concept of innovative milieu we try to tackle that question by looking for regional autonomous processes. The succession of project building and know-how development allows us to understand how innovation appears, and therefore reinforces the difference (the specialisation) between a region and its environment. Recently, some authors (Sabel, 1989; Storper, 1992) have mentioned learning as a basic factor for regional competitiveness, but without showing the mechanisms which link learning, innovation, the creation of competitive advantages, spatial proximity, and spatial shifts.

As mentioned above, the case of the Jura region over a relatively long period shows that milieux develop where perceived shifts in the technical and market

environment make innovation a workable opportunity. But when techniques stabilise, when the shape of new products is fixed, classical rationalisations begin anew. As an example the development of quartz modules is quite apt. The quartz watch was invented during the 1960s through decentralised processes which diffused slowly until 1975. At that time, the largest firms in the region began to implement the production of the components for these modules, and in 1982, techniques had stabilised. One firm gained a monopoly for producing these modules in Europe. Production today is vertically integrated and very automated. This, and other similar mechanisms operating in the region today, suggest that the existence of innovative milieux is related to certain circumstances, namely shifts in techniques and in markets. Therefore, when these shifts slow down, traditional centralised and hierarchical processes are likely to begin again. This idea is opposed to Piore and Sabel's (1984) and Storper's (1992) thesis of the convergence of industrial activities to a new single organisational model, called 'flexible specialisation'. If techniques and products stabilise, new hierarchies are likely to be established.

In my opinion, two basic logics of regional development exist (Crevoisier, 1990; 1993): on the one hand, regional milieux, or whichever approach is focused on autonomous creation of externalities; and on the other hand, the classical spatial division of labour, with centralised and hierarchical organisations as determining actors. Obviously, today's transformation of spatial hierarchies has to be understood within this framework. Each of these logics *uses space in its own way*. Regional milieux develop through the *proximity* of regional actors; the spatial division of labour develops because there exist *separate* spaces between which barriers or distance create the differences; the spatial division of labour uses space as a *support* and takes advantage by organising relationships between these separate spaces. From the characteristics of the historical period, one or other of these logics predominates. Presently, regional dynamics is in the lead and challenges established hierarchies, but for how long? Note that even if this movement is only temporary, it is extremely important to understand how new or regenerated industrial activities emerge and which spatial shifts are likely to take place.

Conclusion and policy implications

The concept of a regional milieu is aimed at explaining the emergence of newly localised industries. Its uniqueness and strength is in the tackling of these problems through innovation. The GREMI group investigates many types of regions in order to understand the common features of innovation patterns. I have extended these contributions by giving an operational definition of the milieu and by examining how over a thirty-year period the Jura region transformed its industries (Crevoisier, 1993). Observation over a long period of time shows the role of groups or cohorts of professionals in instigating the development of new activities in order to recreate a sufficient income basis in the region. This process is possible because know-how exists and develops; rules for cooperation between regional actors have also developed; techniques and markets shift quickly enough to prevent the stabilisation of larger centralised organisations; and because local attitudes, identities, and traditions allowed or even instigated decentralised project building. We can therefore understand how regional dynamics manage to create new activities, therefore challenging established spatial hierarchies, which was the aim of this contribution.

This picture clearly contains certain ideas about policies. A regional milieu must rely on a local capacity to perceive opportunities and constraints in the environment, and at the same time shows how the constraints can articulate with existing local resources. Obviously, during this process, local and regional authorities can play an important role. In the recent history of the Jura region for example, public

intervention played a discrete but effective part, not so much by creating these milieux but by supporting and prolonging them through training programmes, research funding, innovation support, and so on. The innovation processes described above develop across organisations. One of their most remarkable features is precisely how they overcome organisational barriers. Very often they include organisations such as public agencies, laboratories, and political bodies.

A regional milieu is transorganisational and provides room for public or semiprivate intervention. An example of how public, semiprivate, and private initiatives mix in such a milieu is a *regional industrial fair*. These fairs appear as miniature milieux. Local industrialists participate in them not so much to sell more, but rather to have a look at their competitors, and for potential collaborations with these competitors or with other local actors. Training and research institutions are generally present, as well as local chambers of commerce, financing agencies, and public or private promotion institutions. In itself the organisation of such an event is often an occasion to mobilise many kinds of regional actors in a collective project. However, regional industrial fairs are only an illustration. A clear conclusion of this study is that there is plenty of room for diligent policy actions even on a small scale. These actions may considerably alter the long-term evolution of a region. This is in no way an original thesis. Nevertheless, it is particularly important to remember it at present because many opportunities still exist.

Another element to take into account with regard to regional policies is the risk of external takeover. Too often, local developing firms fall into a liquidity trap. Here too, a certain policy, which mixes public support and private initiative, should be possible. It is clear therefore that it is important to keep a certain amount of regional control in order to allow local decentralised innovation processes to continue.

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