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# Non-technological innovation and multi-local territorial knowledge dynamics in the Swiss watch industry

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**Abstract:** Over the last few decades, territorial approaches have generally tried to explain how regions have specialised their production systems around specific path dependencies and technological innovation; how their specialisation enabled them to compete locally in the global market. Some socio-economic changes and recent theories have addressed new theoretical questions regarding new dynamics of knowledge, new territorial relations and new types of innovation.

The case of the Swiss watch industry is used here to illustrate different aspects of this new approach. We propose to look at the present Swiss watch industry as a complex system of production-consummation of authenticity where non-technological innovations have become critical. We also explain the importance of combinatorial knowledge dynamics as well as diffusion and legitimisation processes. Finally, we propose analysing the region within complex *multi-local knowledge dynamics*, rather than considering it as a specialised local system in a global market.

**Keywords:** non-technological innovation; NTI; territorial knowledge dynamics; TKDs; technological trajectories; territorial innovation models; TIMs; authenticity; watch industry; Switzerland.

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## 1 Introduction

In the traditional view of industrial economy, technology evolves as an historical process along technological trajectories initiated by radical discoveries and consolidated incremental learning (Nelson and Winter, 1982). Technology is also considered as the main driver for economic innovation because it allows the improvement of functional quality in goods and services on the market.

Over the last few decades, territorial approaches have played an important role in the economy of innovation. They have given rise to a vast array of literature on conceptual models such as innovative milieus, technopoles, industrial districts or more generally clusters, which have been synthesised by Moulaert and Sekia (2003) under the generic name of *territorial innovation models* (TIMs). On the one hand, these models have been able to explain the role of technology and 'diffuse focused' learning between actors at geographical proximity as innovation drivers. On the other, they presented the evolution of local production systems as a specialisation process in the global economy.

Technological innovation is usually seen as a one way process, competitive as such, and providing homogenous definition of quality which is universally agreed. Production and consumption processes remain strongly independent by the fact that technology is supposed to improve the quality of a product in an 'objective' way. This reinforces the separation of producers at the local scale and consumers at the global scale.

A recent and growing literature on knowledge economy sees learning and innovation as ongoing processes rather than as intermittent technological improvement occurring along a product life cycle. New theories describe innovation processes where knowledge is mobilised more systematically, more continuously and over greater distances. Furthermore, studies of creativity, cultural industry and cultural resources, for instance, have argued that numerous innovations today appear more frequently via socio-cultural dynamics than techno-scientific ones.

By removing technology as the unique innovation driver, new socio-economic relations can be considered. For example, the notion of quality does not always relate to accuracy or functionality and can be different from one socio-cultural context to another. The relation between production and consumption systems have changed and the traditional regional networks have become more dispersed.

From that perspective, new theoretical questions appear regarding new learning processes and territorial relations. What are the new ways to be competitive through non-technological innovation? What are the new actors involved and what is the kind of relation they have with each other? How is the place of the consumers changing? What are the new territorial relations and the new role of the local scale in such processes?

The first part of this paper proposes a brief review of theories on territorial development. It explains how regions were generally conceptualised as specialised production systems driven by specific path dependences and technological innovation and how specialisation enabled them to compete locally on the global market. Then, recent changes and different theories are presented in order to open new theoretical questions regarding new knowledge dynamics, new territorial relations and non-technological innovations (NTI). The concept of *territorial knowledge dynamics* (TKDs) is finally proposed as a possible conceptual framework in order to explain new economic and territorial stakes in a broadened conceptual paradigm.

In the second part of the article, we present the case of the Swiss watch industry under different aspects of the theoretical questions raised in the first part. We show how this sector has shifted from a production of functional watches to more 'emotional' ones and how NTI have become critical. We also analyse the territorial consequences of such a change.

We propose to see the contemporary watch industry as a complex system of production-consumption of authenticity where NTI have become critical. We argue that complementary knowledge in communication, marketing, fine arts, etc., is important as well as technical skills. The notion of quality related to Swiss watches has changed and new socio-economic relations between watch producers and watch consumers have developed. In particular, diffusion and legitimisation processes are important for economic exploitation of authenticity. Finally, we analyse the place of the traditional region of watch-making within complex *multi-local knowledge dynamics.*

## 2 From technology, innovation and proximity to combinatorial and multi-local TKDs

This section gives an overview of different theories developed principally over the 1980s and 1990s on innovation and regional economy. Although we are aware that the models discussed here come from different theoretical approaches, there is no space for a detailed consideration of these different approaches here. However, they share key features and thus we consider them as a group.

These models are then reconsidered through social, economical and technological changes as well as through new conceptual theories.

### *2.1 The traditional paradigm based on technological trajectories, TIMs and cumulative knowledge dynamic*

In an industrial approach to economy, Nelson and Winter (1982) distinguish between radical innovations and technological trajectories. Radical innovations (for example organic chemistry) appear as exceptional phenomena. Their origin is exogenous to the system and they open up a new development constituted by the succession of innovations that mobilise the basic techno-scientific principles of radical innovation. Innovation therefore takes place along new trajectories that appear intermittently. Each phase leads to the refining of new techniques or products that are then implemented over a certain period. The way knowledge is used and generated adapts and becomes specific according to this trajectory, increasing by the way the *division of labour* within the industry. Thus, sectors of activity and companies develop that are distinct from one another in terms of their technologies and products. The knowledge dynamic is mostly *cumulative* (Antonelli, 2005) in the sense that use and generation of knowledge coordinate in coherent way over time. In this article, we define a *knowledge dynamic* as a *learning process where interplays of use and generation of knowledge take place.*

Other theories suggest that *multi-functional* (Planque, 1991) or *diffused focused* (Maskell et al., 2006) learning, which apply to several dimensions at once and in which the participants' contributions are not clearly established at the outset, require assurances regarding relations between the actors (trust, commonly respected rules on competition /

cooperation, relational capital, common language, etc.; Grossetti and Godart, 2007). Such rich learning is most often achieved through geographical proximity.

In parallel, *mono-functional* (Planque, 1991) or *strong focused* learning (Maskell et al., 2006), whose objectives are clearly identified from the outset and within which the division of labour among the various participants is clearly established, reduces uncertainty or restricts it to calculable risks. As external effects are in principle known, anticipated and sought after by the organisation (whether a network or via intra-company projects), such learning can overcome the barriers represented by distance or by the absence of a common past.

Multi-functional learning at proximity creates specific regional path dependences and reinforces cumulative knowledge dynamics along a certain technological trajectory. These local innovative dynamics enables a region to become part of an increasingly global economic environment. The relation between local and global contexts is generally perceived as a two-way phenomenon. Regions that come under pressure because of the increase in competing producers or technologies are supposed to adapt locally through appropriation of new technologies or through organisational changes. Inversely, the regions that produce radical innovations achieve penetration of a global market and modify the market's characteristics.

Multi-functional learning requiring proximity, associated with a mono-functional opening to increasingly open markets and technologies that are developed elsewhere, led to widely recognised theories on regional development. Benko and Lipietz (1992) offered, at the time, an overview of these approaches (industrial districts, science parks, etc.). We should also mention the GREMI research programme which, as of 1985, progressively drew up and documented the concept of the *innovative milieu* (Camagni and Maillat, 2006). A presentation of the history of these TIMs has recently been completed by Moulaert and Sekia (2003).

Innovative regions are those that are capable of imagining their local production system within a global environment by means of a development process that is above all endogenous. In other terms, in order to be innovative a region must be capable of *matching its dynamics of the use and the generation of knowledge*. However, traditional literature on TIMs focuses on innovation processes rather than on knowledge dynamics. It is only with the emergence, towards the end of the 1990s, of theories on learning regions that knowledge, as such, was considered as a resource for local innovation (Lundvall, 1992; Florida, 1995; Maillat and Kebir, 1999).

It should be noted that these models strongly reflect the idea that industry is the driving activity in innovative regions. Fundamentally, production and innovation take place at the level of a differentiated region and are sold in an undifferentiated global market ('think globally, act locally'). Moreover, it should be noted that innovation is most frequently technological, and that efforts are made to organise space around this reality (in the form of technopoles).

## *2.2 Significant socio-economical changes*

Some important and critical recent changes have affected the traditional theoretical paradigm presented above. Three of them seem to be crucial in order to build a more complete understanding of new conceptual considerations within our current society.

The first of the changes to the conditions for innovation is that numerous recent technologies, such as information technology or the internet, have become highly

decompartmentalised since they have been brought into – and perfected within – an extremely large number of activities and have also been combined with other technologies. Antonelli (2005) speaks of *fungible* knowledge that has become increasingly flexible and configurational, i.e., it can be adapted to the needs and ideas that develop in many different sectors.

Secondly, the unprecedented increase in the mobility of goods, services, capital but above all of information and the labour force has strongly affected the flow of long-distance exchange. New multimedia technologies, the development of transport and political or institutional creations such as the European Union or the World Trade Organisation are all leading to a massive increase in information and knowledge exchange and are thus opening up an extraordinary potential for both innovation and competition.

Thirdly, several studies have underlined that many innovations today take place more frequently via socio-cultural dynamics than techno-scientific ones. Changes to society's values and practices are currently responsible for changes to products and services. This phenomenon takes on various forms, and has been the subject of many research projects on *cultural resources* (Kebir and Crevoisier, 2008) or on *creativity* (Cooke and Lazzeretti, 2008). First of all, and on a fairly trivial level, the growth of the cultural industries (media, entertainment sport, tourism and leisure, cinema, video games, etc.; Power and Scott, 2004) requires above all socio-cultural knowledge. Secondly, the incorporation of cultural and aesthetic aspects, etc., within products is taking on increasing importance within the components thereof. Clothing, watch-making and the automobile industry, etc., are examples of traditional industries whose products are evolving more and more according to fashion, aesthetic trends or society's ethics. Finally, we see the significant development of 'the experience economy' (Pine and Gilmore, 1999), which consists of creating a high level of added value to a classical good or service by incorporating various types of experience related to the consumer's participation or emotions (branding, events, coaching, etc.).

The incorporation of knowledge into economic processes thus no longer takes place in a sporadic manner but one that is systematic and permanent (Ascher, 2001; Foray, 2004). Today, therefore, innovation is, in many ways, radically different from the traditional model of the industrial society (Colletis-Wahl et al., 2008). Notions of industrial sectors and areas have lost their coherency. Knowledge dynamics are at present articulated in a cross-sector manner, around composite entities such as health, communication or tourism (Cooke and DeLaurentis, 2007). Increase in mobility has loosened spatial and temporal constraints, and the issues at stake are of a new kind. The distinction between rich (multi-functional) learning requiring physical proximity and more finite (mono-functional) ones that can take place at distance seems to have become more relative today. The renewed importance of the socio-cultural component of products and services highlights the increased value of *symbolic knowledge* (ibid.). With the creation of more symbolic value-added, the general role of the consumer has become of greater importance in the production-consumption value chain.

The new spatial forms that rich learning is taking on justify to take territorial relations into account within the analysis of current economic phenomena. A genuine research programme on territorial economies consists of exploring these new forms and understanding how they influence economic processes. The broader territorial paradigm that we propose here considers knowledge as a cognitive process that is shared among humans and that is generated and used within social interactions, in various contexts. The

paradigm attempts to go beyond the traditional one of innovation and proximity with a view to developing an approach constructed around the concept of TKDs.

### *2.3 NTI, combinatorial and multi-local knowledge dynamics*

At present, the economic actors have easier access to extremely numerous areas of knowledge that are spatially dispersed. Their problem is one of identifying and mobilising these resources within a coherent business model. Different works (Laestadius, 1998; Cooke and DeLaurentis, 2007; Asheim et al., 2007) highlight the combination of analytical (science-based) knowledge, synthetic (engineering) knowledge and symbolic (branding, design, advertising) knowledge, which all complement one another within industrial processes. Technological knowledge has thus simply become one of the types of knowledge that are combined within economic production. Nowadays, NTI is as important as traditional technical innovation. In addition, the shift to more cultural resources and NTI has increased the role of the consumer. Production and consumption systems are strongly integrated from now on.

If we consider that numerous learning and innovation processes take place today via combination of knowledge between various places, scientific questions arise around the way knowledge can be mobilised locally. Within this logic of combination, learning processes are strongly conditioned by knowledge that has already been generated upstream and capability of ad hoc use of knowledge is central. The *project* becomes increasingly structuring. In other words, it is to a lesser extent the enterprise, the sector or the technology that shapes the economic processes and to a greater one the ad-hoc combination thereof around a production / consumption system with a fairly short lifespan. Today, it is no longer simply a question of accumulating knowledge along a trajectory but to an increasing extent of articulating it with knowledge from the exterior.

Doz et al. (2001) argue that today it is necessary to go beyond traditional theories of the spatial division of labour resulting from low-cost production strategies and to develop new concepts based on the capacity to draw up strategies or projects in a *meta-national* knowledge network. It is no longer sufficient for an enterprise to establish a good global production or distribution network. The most competitive enterprises are today those that take the most rapid decisions regarding how they will act globally and that combine various types of knowledge that exist elsewhere. It is no longer a question of simply going out to find the appropriate competencies where they are the least expensive, but one of imagining new projects based on competencies that are currently accessible. The availability of competencies precedes and drives innovation.

Furthermore, in this new conceptual paradigm, the traditional articulation between the local and the global scale has to be reconsidered. Generation and use of knowledge are now dynamics that take place at different scales and between different places, neither within a single region nor within an undifferentiated global environment. This fact is not really new for technological dynamics either within a same sector (for e.g., rich interaction between Toulouse and Hamburg for aircraft engineering) or between different sectors (for e.g., interaction between local Japanese capabilities for miniaturisation and a Finnish firm focused on mobile telephony competencies).

But this phenomenon also appears for non-technological knowledge dynamics at two levels. Firstly, at the level of the production system, some key locations in the field of fashion or lifestyle such as Paris or Milan have become non-technological knowledge producers. They combine, for instance, with the Swiss watch industry in order to innovate

in the field of luxury goods. Second, as non-technological knowledge dynamics are more often connected to consumption contexts, multi-local knowledge dynamics develop within production-consumption system. This is, e.g., the case for the interactions between specific people magazine conceptualised and embedded in the local consumption culture of Singapore and the Swiss watch industry. These two later examples related to watch industry are discussed further in the second part of the paper.

In the proposed paradigm based on combinatorial and multi-local TKDs the role of regions is changing and it is especially the case for cities. On the one hand, work on *creative cities* (Landry, 2000; Cooke and Lazzeretti, 2008) reveals that certain cities are becoming central in the process of cultural and non-technological knowledge generation. Those such as Paris, London or New York have long been aware of and used this phenomenon. Today, however, traditionally industrial cities such as Bilbao, Barcelona and Hamburg are making use of cultural dynamism in order to retain their positioning. Industrial cities that have not been capable of carrying out a conversion in the direction of more symbolic knowledge dynamics have in many cases lost some of their importance over recent years. On the other hand, cities have developed a strong capacity to combine and use long-distance knowledge. As Gaschet and Lacour (2007) have observed, cities have become 'clusties' since they are no longer just a specific knowledge system (a 'cluster in the city') but are also becoming a central element within wider territorial dynamics by means of activities that permit the anchoring of mobile knowledge (a 'cluster by the city'). Here, for example, knowledge-intensive business services (KIBS) play an overriding role (Simmie and Strambach, 2006; Strambach, 2008).

In the second part of this article, the conceptual new paradigm described above is approached through the case of the Swiss watch industry and its recent development. Possible new relations are observed in the field of non-technological innovation, knowledge economy and territorial economy.

## 3 The case of the Swiss watch industry

The case of the Swiss watch industry, principally in the Jura, illustrates many aspects of the propositions made above. Until the beginning of the 1980s, the Jura was competitive on the global watch market through its technical know-how implemented by geographical proximity learning. After that time, in order to remain competitive, Swiss manufacturers developed new business strategies using culture as new resource for innovation. First with design and diversified marketing activities like sponsoring and later with much more comprehensive activities like the organisation of events or the creation of museums, Swiss watch companies developed *desirable product and narrations* which mobilise customer's knowledge and identities in much more complex ways than previously. Thus, the importance of non-technological activities has increased within the traditional watch-making firms as well as out of them. With the broadening of related activities, new places have also gained in importance in that complex production-consumption system.

### *3.1 Methodology*

The observations and analyses made in the following part are based on different sources. They present preliminary results of a regional case study done within the frame of a wider European Commission funded project called *Eurodite*

(http://eurodite.bham.ac.uk/). This project conducted by 22 research teams in 12 different countries focuses on learning processes within regions and between regions, within firms and out of firms and tries to analyse cross-sector knowledge transfers. The research on the Swiss watches industry undertaken as part of this project was based on the collection of different documents and interviews with key players in the sector.

The study builds on a body of research undertaken over the last twenty years about the same sector, in the region of the Jura Arc (Maillat et al., 1997; Crevoisier, 1993a, 1993b; Maillat et al., 1993). Those studies developed and used different theories about innovative milieus and cultural resources. In addition, a recent study focusing on watch design, advertising and emotional components of watches has been used to complement that previous work (Babey et al., 2007).

Furthermore, we collected specific information through the analysis of over one hundred articles in regional newspapers and different magazines dedicated to watches and luxury. In parallel, we undertook 30 semi-directional interviews with watch-making firm directors, human resource managers, communication, public relation and marketing as well as with external journalists, publishers, public and private players directly or indirectly involved in the promotion of the authenticity of Swiss watch-making. Questions to people in watch-making companies were about the evolution of their business strategies and their links with external players in and out of the region. Questions to people out of watch-making companies were about the kind of activity they provide to the watch sector, about the way they interact with that sector, about what the value added of their activity is and about the spatial network they are involved in.

We finally did a qualitative data analysis and tried to focus on the reason of the actual success of the watch industry worldwide, the main changes in the sector over the last years and the involvement of new actors, knowledge and spaces in that success.

We are aware that strategies and knowledge used by the various watch-making firms differ from one firm to another, according the range of their products, their history or market. However, we tried to catch and describe some general historical changes, new types of social and territorial relations rather than analyse detailed relations occurring at the level of different watch-making firms. We focused on a meso level rather than on a micro level.

### *3.2 The traditional watch production system*

Until the 1970s, the Swiss watch industry displayed many characteristics of the traditional conceptual paradigm described previously. Through specific and localised technical competencies, the Swiss watch manufactories in the Jura Arc and in the city of Geneva became leaders in the international watch market.

Technical innovations were driven by cumulative knowledge dynamics (empirical and analytical improvement of the production system) taking place mostly in the region within which a large range of small suppliers and subcontractors as well as high-level technical education bodies were concentrated. This proximity of actors facilitated multi-functional learning which enabled the adaptation or the development of new products (e.g., the first mechanical wristwatch, the first quartz wristwatch) and of competitive industrial practices (productivity and standardisation).

At that time, the international demand for watches was higher than the global supply and the Swiss watch industry was a strong market leader. Watch manufacturers mainly developed strategies of industrial production and focused their advertisement on the

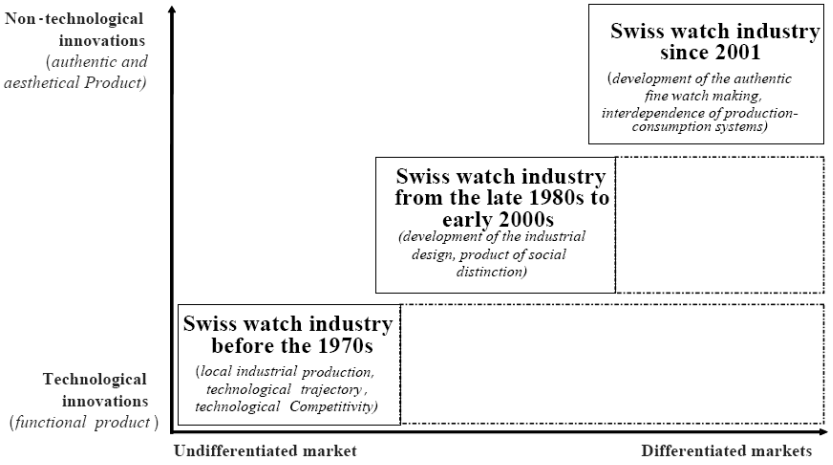
technical quality of their product (Künzi, 2007). Innovations mostly took place at the level of the product.

TKDs were articulated mostly around the production system at the local scale. At the global scale, the market was mainly considered as homogenous.

With the development of the quartz technology in the 1970s, the production costs for watch components suddenly dropped and new international competitors entered the market. Not able to adapt to this new context and to compete effectively, the traditional Swiss manufactures – and with them the whole region of the Jura – fell into a crisis. Between 1970 and 1984, the number of employees within the sector decreased from about 90,000 to about 30,000 and the number of enterprises from about 1,600 to about 600 (Federation of the Swiss Watch Industry FH, 2008).

To get out of the crisis, the Swiss watch industry was subject to two fundamental changes (Crevoisier, 1995). On the one hand, NTI such as design, fashion or exclusive marketing, etc., as well as accuracy and precision, became critical to the Swiss watch as an object of social distinction. On the other, larger companies encompassed small traditional manufactures in order to standardise and reduce the production costs of electronic modules. Progressively, innovation strategies and the role for technology changed and with them new TKDs appeared.

**Figure 1** Evolution of knowledge dynamics and market strategies in the Swiss watch sector




*Source:* Authors' own compilation

## *3.3 Non-technological innovation, customisation and combinatorial knowledge dynamics*

Over the 1980s, on the one hand, the production of watch modules had been mostly standardised by the concentration of production activities within larger companies, in order to be competitive on the international market. On the other, watch-making firms differentiated their product through design and fashion components. Progressively, Swiss watch-making companies are developing their special characteristics by increasing the aesthetical value related to the design of the visible part of the watches (the most famous example is the *Swatch* watch). Communication strategies and products progressively

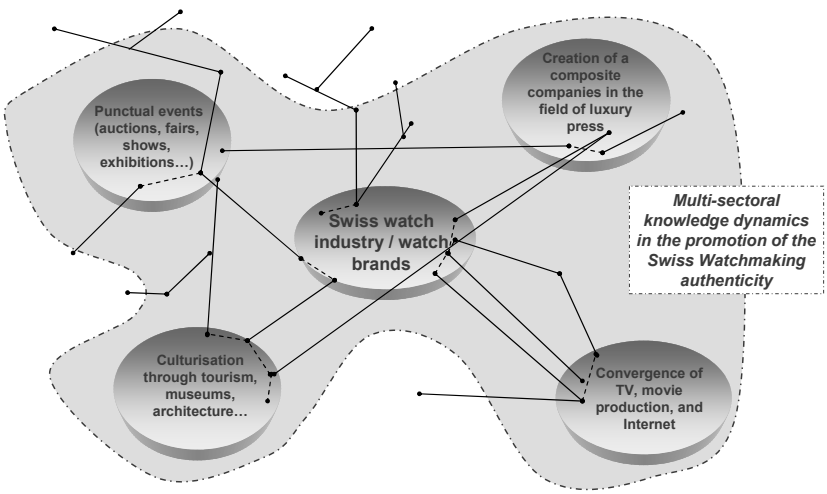
become more oriented towards social and cultural distinction of consumers (sport, business, fashion, luxury, …). In parallel, traditional fashion and luxury companies from France and Italy established themselves in the Jura in order to produce branded watches. The 'Swiss made' value added to watches became as much cultural as technical.

This evolution stabilised over the late 1990s but met a new phase with the rise of the luxury sector and the 'come back' of mechanical watches (Figure 1).

According to the theory of the technological trajectories (Nelson and Winter, 1982) the traditional mechanical watches should have disappeared after having been replaced by a more competitive technology, in our case the quartz technology. Contrary to this theory, Swiss mechanical watch production has constantly increased since the late 1990s. The global value of their exportation has trebled over the ten last years and has been largely exceeding the global exportation value of electronic watches since 2001 (Federation of the Swiss Watch Industry FH, 2008).

Besides design features, additional 'emotional components' to the product have become of greater importance. The increase of the emotional value of Swiss watches need a more personal integration of consumers to the creation process of image and authenticity. Unlike the traditional advertising strategy mainly based on the product itself, Swiss watch-making firms have developed a coherent production system of image, emotion, authenticity and experience related to their brands, Künzi (2007) refers to as the *creation of idealised universes*. Swiss watch industry is no longer constituted only by watch production companies but also by brands in competition. Swiss watches are an emotional product based on the creation of authenticity (Gilmore and Pine, 2007) rather than a purely functional one.

**Figure 2** Combinatorial knowledge dynamics in the valorisation process of Swiss watches




*Source:* Authors' own compilation

This phenomenon can be regarded as a whole non-technological innovation system since technology is no longer the central driving force of innovation. Most often, technology is adapted following the need of idealised universe created by the brand (e.g., a new watch made of a new material especially designed for a special sport event). This system does

not only articulate knowledge dynamics in a cumulative way but rather combines diversified knowledge. Knowledge interactions have developed out of the traditional watch-making activities towards complementary activities such as media, events, tourism, film production, architecture, interior design, etc. The creation by watch companies of specific institutions (cultural and fine arts institutes or foundations) responsible for organising events, promoting watch-making history, or culture in general, illustrates a part of these new knowledge dynamics.

Combinatorial knowledge dynamics take place within watch-making firms as well as out of them (Figure 2).

More and more, people with academic background in human sciences or fine arts are taken on to deal with event organisation, with communication or to develop museums, exhibitions or aesthetical designs. For their buildings, companies contacted renowned architects or bought ancient prestigious buildings (Le Corbusier's Turkish Villa or the site of Plan-les-Ouates where several watch manufactures have built sophisticated and artistic buildings), stages where clients can experience the traditional fabrication of watches (opportunity to see watchmakers at work) and museum presenting the history of the brand. Thus, architecture and interior designing have also become important knowledge resources. However, the most relevant development is certainly characterised by the creation or reinforcement of activities which were not traditionally connected to the watch industry sector. For instance, some film production companies have dedicated part of their work especially to the promotion of watches. As well web-TV, auction enterprises, event organisers, communication and multimedia firms have specialised in the field of watch promotion. In parallel to the traditional link between firms and business services, strategic cooperations have also appeared between services (new connections have appeared for example between media activities, events organisation and tourism).

With the rise of the emotional value of Swiss watches and the increase in marketing expenditures, new economic opportunities have been created for non watch-making enterprises. In addition, new possible combinations of activities in media, fashion and event have appeared in the creation process of image and authenticity. A fine example of this phenomenon is the creation by an important Swiss press group of a special entity dedicated to watches and luxury goods. This enterprise brings different knowledge from different locations such as several watch magazines published in Switzerland, a fashion magazine in Paris, a watch lifestyle magazine in Singapore but also an international centre for watch documentation, a specialised website dedicated to reporting the latest news about watches and a famous watch award in Geneva.

The evolution of the most famous World Watch and Jewellery Show established in Basle illustrates the need for specific knowledge dedicated to the emotional valorisation of watches. Its exhibition halls are no longer simple show rooms but stages where clients enter into emotional experiences and fantasy worlds (the names of the halls reinforce this idea: hall of emotion, hall of experience, hall of dreams, etc.). As well as connecting producers and clients/consumers, the event also brings together media (special day and special place only for journalists) and multimedia (live video diffusion of auctions happening at the same time in Geneva).

However, it is important to keep in mind that this complex system of exploitation and creation of non-technological-based value added remain for the most part funded by watch-making companies (through sponsoring, advertising, sub-contracts or mandates). In other words, all the actors involved in and out of the watch industry relate to a common business model based on watch selling.

Competition between watch brands on the international market is the driver of the complex system described here. In order to communicate properly and avoid alteration of their authenticity, brands strongly seek to control this system. However, a certain degree of autonomy is crucial for the co-creation, stabilisation, diffusion and legitimisation of authenticity. We discuss below, how, between autonomy and control, complex interdependencies are strengthening between an increasing numbers of players.

### *3.4 The production-consumption system: the diffusion and legitimisation of authenticity*

In a traditional paradigm of industrial and technological product selling, quality is evaluated through functional and tangible indicators (accuracy, resistance, etc.). In a technological innovation system, quality is considered as an objective definition; distribution channels and quality certification are keys of competitiveness on the global market.

It was, in a certain way, the case of the watch industry before the 1980s. Watch companies were mainly concentrating mainly on technical quality control in their industrial chain. Since the late 19th century, autonomous laboratories had been established in Switzerland in order to control and certify the technical quality of Swiss watches. In 1973, the COSC (in French, *Contrôle Officiel Suisse des Chronomètres*) – a non-profit association created by public authorities and the Federation of the Swiss Watch Industry – encompassed these traditional institutions.

Watch manufactures were already developing a certain image to their product and brand (mostly through general advertising) but were not particularly seeking to control the way this image was delivered to the final consumer. On the market, general retailing agents or independent shops were selling watches from different brands in a rather independent strategy. In addition, the Federation of the Swiss Watch Industry was in charge of some marketing for the Swiss watch industry in general.

With the rise of authenticity and branding as element of differentiation and competitiveness, the perception of quality was changed. While technological quality can easily be certificated through functional characteristics (punctuality, water proof, etc.); such non-technological components require more complex processes of *authentication*.

The Swiss watch industry has adapted to this phenomenon. The creation process of authenticity has become more complex and the production and consumption systems more deeply integrated. New strategies, systems of distribution and certification, as well as a new type of quality control, have appeared.

Firstly, because manufacturers not only produce high technical quality products but also highly valued brands, their traditional distribution strategy in the international market through independent retailers was not enough. They needed to *diffuse* their authenticity as a whole part of their product and in different way according to the perception of different consumers. Internally, many companies have established mono-brand shops in international cities have hired specific local managers or have created subsidiaries which are responsible for fitting the authenticity of the brand with the local consumption context. Their websites have become multimedia shows where the diffusion of emotions is more important than real and practical information about the watch-making company and its product (for instance, the great importance of videos).

Outside the firms, complementary activities have appeared to support this process of diffusion and also *co-produce* images related to the emotional universe of watches.

Remaining multi-brand shops have developed new marketing strategies (e.g., 'The highest watch shop' on the top of the Matterhorn mountain), magazines have developed special magazine on fashion, lifestyle, etc in relation with watches, film producers or web-television have become documentary and advertising producers to be diffused all around the world, etc. However, watch-making firms keep the system under control by providing the main financial income to this system. This control is crucial for them because they have to avoid incoherent messages or the 'wrong' presentation of their authentic product.

Secondly, certification of the technical quality of watches isn't sufficient by itself. Watch brands also need an external *legitimisation* of the authenticity linked to their product. In this field, as it already was the case with the COSC, support of what we will call *legitimising third parties* is crucial. For instance, independent journalists are supposed to provide a neutral voice about the coherence of the authentic link between a brand and its product. Independent auctioneers are expected to select and propose the best watches. Watch awards organised and sponsored by non watch-making firms are also part of this legitimising process.

However, this independence isn't perfect because watch-making firms can partly influence the legitimising process. For example, they often have the capacity to select journalists attending certain events or can buy some of their own watches at an auction. Nevertheless, this tension between control and independence within the process of creation, diffusion and legitimisation of authenticity is central. Independence has to be respected, at least formally because customers are disposed to pay for authenticity but are hard to please and need to be confident in some external expertise.

From the perspective of the watch industry, non-technological quality requires more complex interdependencies. The traditional manufacturers, as well as the complementary activities described above, innovate together by combining knowledge and different players. As they combine, TKDs are affected and challenges facing regions are changing.

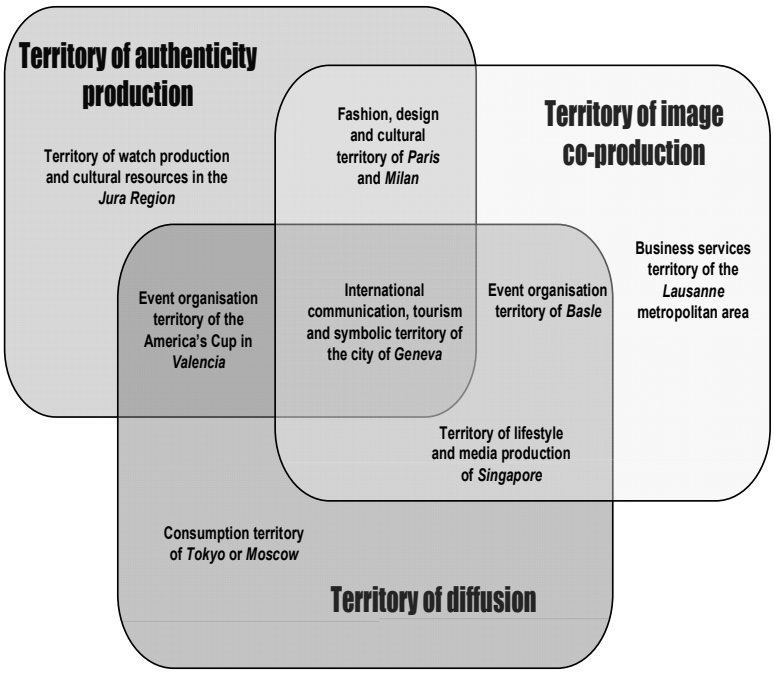
### *3.5 Territorial and institutional considerations*

As described above, the development of NTI in the Swiss watch industry has increased combinatorial knowledge dynamics because of the need to sell a comprehensive set of products, services and cultural communication in different markets. Against this background, territorial relations have also evolved through the impetus to produce and diffuse authenticity (Figure 3).

While watch manufacturing competences remain strongly embedded in the traditional Jura region, this knowledge is exploited as a resource for authenticity. A first aspect of that phenomenon has been provided by Kebir and Crevoisier (2008) around the concept of *cultural resources*. Technical aesthetical and cultural notions of quality overlap. Traditional labels such as 'Swiss made', 'COSC', or 'Poinçon de Genève' not only certificate the technical quality of watches but also legitimise the image of the regional tradition and know-how for watch-making. More than 35 public or manufacture-owned museums of watch-making propose a link between regional historical knowledge, technical path dependencies and authentic value. La Chaux-de-Fonds and Le Locle, two historical cities of watch production, are preparing an application to become world heritage of the UNESCO based on their industrial background. However, one of the most interesting features of this territorial link to authenticity is that there is almost no positive support for a common promotion of image provided by public bodies or watch-making

firms together (no common territorial marketing strategy). Watch brands are rather reluctant to share their control over image and authenticity (since the 1980s, the Federation of the Swiss Watch Industry does no longer have a marketing role). Regional authenticity for watch-making mostly emerges from the authenticity produced by each firm in competition with each others.

**Figure 3** Multi-local TKDs of the valorisation process of the Swiss watch-making system




*Source:* Authors' own compilation

Some TKDs related to image co-production have also developed with other areas. Some metropolitan areas concentrate more business services in the field of media, communication, arts, events, etc., and can be seen as 'symbolic knowledge generators'. Their importance for combinatorial knowledge dynamics has grown and the traditional region tends to broaden. The Lausanne metropolitan area was traditionally not part of the watch-making region. Now, this area has become more and more important for providing specific complementary knowledge to the watch industry in marketing, communication, media or multimedia services.

With the increasing involvement of the consumer in the system, a third type of territorial relation have become of greater importance. Some places are actually diffusion spaces where the Swiss watch manufacturers sell their product through an image adapted to the local market culture. For instance, a place like Tokyo is a platform where brands organise shows, shops or exhibitions and where authenticity created around the product diffuses locally.

It is interesting to observe that certain territories fulfil several functions at the same time. Cities like Paris or Milano are in the same time territories of image co-production

(communication, art, design, marketing services) and territories driving complementary authenticity (historical tradition for fashion, luxury, jewellery, etc.).

Some other places are territories of authenticity diffusers and image co-producers at the same time. It has always periodically been the case of the city of Basle, which is not directly involved in watch production but becomes once a year the international centre of the watch industry through its World Watch and Jewellery Show. More generally, the lifestyle and media system of Singapore diffuses authenticity of Swiss watches to the local culture but also co-produce image by the creation of new kinds of lifestyle Medias dedicated to watches, for example.

Authenticity creation and diffusion functions can sometimes overlap in the same territory too. For instance, it was the case of Valencia during the international sailing competition of the America's Cup. The city became, temporarily, a place where various watch brands tried fit a part of their authenticity to the event by special sponsorships or special products.

Finally, the city of Geneva has continuously been an international promotion portal for the whole Swiss watch industry with traditional cumulative knowledge dynamics (implementation of watch manufactures) and combinatorial knowledge dynamics (events, tourism, press, etc.). However, the position of this city in the TKDs of authenticity production, image co-production and diffusion is strengthening. Periodically (through events) or continuously (through services, museums or marketing schools for luxury goods) Geneva can be seen as the place where knowledge dynamics combine, circulate and anchor within the region.

A 'multi-local' approach as presented above proposes an analytical alternative to the traditional articulation between the regional production system and the global market. On the one hand, it enables an analysis of the complexity of interdependencies between different territories all along the value chain of a product. In the case of the Swiss watch industry, the value chain of authenticity production mobilises different knowledge (technological but also non-technological) in different territories (co-production of image).

On the other hand, it also allows the integration of a territorial dimension to consumption knowledge dynamics. In our case, watch authenticity and image production have to be implemented within differentiated contexts of consumption and be diffused in a common, but also in a differentiated and appropriate way, according to different market cultures.

For the original Swiss watch-making region, the ability of local skills and products to interplay with multi-local TKDs is crucial. Watch-making technological innovations are dependent of NTI and develop continuous new combinatorial knowledge dynamics.

Table 1 tries to provide a synthetic overview of different observations made in this article. It is important to keep in mind that the shift we present here is a conceptual shift. It does not represent a portrait of society at different stages. Furthermore, the conceptual framework based on TKDs we propose here does not seek to replace traditional theories on innovation and proximity. It is a possible broadening tool that enables us to take into consideration more complex combinatorial and multi-local knowledge dynamics in which NTI, for instance, play a greater role.

**Table 1** From innovation and proximity to TKDs

| | *Innovation and proximity* | *Territorial knowledge dynamics* |
|---|---|---|
| Unit of analysis | Innovation processes | Knowledge dynamics |
| Mobilisation | Periodical/discontinuous | Generalised/continuous |
| Knowledge articulation | Cumulative and technological trajectories (mono-sectoral) | Combinatorial dynamics of technology and non-technology (multi-sectoral) |
| Marker interdependences | Specialised production systems in the global market | Complex production – consumption systems |
| Territorial dimension | Spatial division of activities/labour | Multi-local knowledge dynamics |

*Source:* Authors' own compilation

## 4 Conclusions

Taking into account NTI, on the one hand, and the increase in the mobility and accessibility of knowledge, on the other, we have tried here to challenge traditional models of territorial development and innovation. However, this paper is not to be seen as an attempt to get rid of traditional theories. We have proposed here a broadened conceptual framework based on TKDs which would enable to analyse new questions.

Firstly, we have reconsidered the role of technological path dependencies (technological cumulative knowledge dynamics) and their impact on innovation. In the case of the Swiss watch industry, NTI have become crucial in order to remain competitive in the global economy. Capacity to produce and promote authenticity related to traditional technological knowledge dynamics creates an important value added and permits to compete globally. To do so, *combinatorial knowledge dynamics* play a greater role. As an example, we have described how watch-making knowledge combines with knowledge from activities like media, event organisation, auctions, tourism, show production or architecture. Nevertheless, technological innovations remain critical to complement NTI. Watches are the materialisation of authenticity and selling watches is the target of the business model for non-watch-making activities as well as for watch-making ones.

Secondly, we observed that, with the valorisation of the non-technological-based value added, production and consumption systems are more interdependent. Swiss watch-making companies no longer control only the functional quality and accuracy of their products but also the way their authenticity and their brand are communicated. In other words, the way watches are consumed is as important for them as the way they are produced. Different knowledge and different players thus interact in a *complex production-consumption system*. This system is moved by the need for watch manufactures to control their authenticity on the one hand, and to legitimate it, on the other. The degree of autonomy left to certain players who provide an 'independent voice' is a crucial issue. The most important role of such *legitimising third parties* is to authenticate the link between technological and non-technological values (origin, history, idealised universe, brand, etc.).

Third, new territorial considerations have been formulated. Reconsidering the traditional distinction between the local production system and global market, we have proposed an analysis based on *multi-local knowledge dynamics*. In the case of the Swiss watch industry, we have identified different territories related to authenticity production, image co-production and authenticity diffusion. From such a perspective, regional knowledge challenges are related to the capacity for interacting within combinatorial knowledge dynamics and with different locations, rather than the ability to specialise into a specific kind of production. The role played by a few cities as creative locations (Milan, Paris) or as relays within different consumption contexts (Singapore) is a significant one. In particular, the centrality of the city of Geneva within the multi-local knowledge dynamics of the Swiss watch industry has been underlined.

In this paper, we assume that new economic challenges in a knowledge-based economy and NTI have to be studied in order to understand the success of the contemporary Swiss watch industry. Our study has shown that the relation between producer and consumer should become of greater importance for future researches, and especially in field of NTI. More generally, we have tried to show that a region is not only the place where technological competences cumulate but also the place where image and authenticity can be created and where multi-local knowledge dynamics have to anchor. From that perspective, besides traditional cluster and technological policies, public support which is more oriented towards multi-sector projects and non-technological knowledge transfers is bound to play an increasing role.

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