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Perspectives on the relation between innovation and locality. The interplay between territorial and functional based systems of innovation

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Abstract

The aim of this paper is to address the NSI framework as the interplay between two types of innovation systems, namely territorial-based innovation system and functional-based innovation system. The fundamental difference between these two types of innovation system is that the territorial one explains innovation as dependent on factors or conditions that are specific to a territory (the importance of place) while the second type addresses the functionality of the system, what do the components of the system actually do, and what it is achieved. Theoretically, the systems of innovation of the interface of two theoretical perspectives: the evolutionary perspective and the institutional perspective. The argument that is put forward is that economic actors and their actions should be at the core of a SI and not space and spatial categories. Empirically, the territorial versus the functional-based innovation systems types will be discussed by considering the case of the mobile telecommunication cluster in Skåne, Mobile Heights, where the focus will be placed on the role of Ericsson. The Mobile Heights case is used as a case to serve the following purposes: to study the interaction firm ? university ? public authorities, to study the role of the firm in the local innovation system and how it supports the local innovation/entrepreneurial activities, the interplay between different levels of innovation system, in this case the interplay between the national and regional innovation system, but also a firm?s innovation system.

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Introduction

The importance of innovation is widely accepted and there is extensive literature on the theme of innovation. Innovation is at the centre of economic growth (Schumpeter 1934, 1950). Innovation is the key factor behind corporate and national competitiveness. Economic development is understood in terms of knowledge creation and innovation. Firms strive to be competitive and national governments formulate strategies to encourage innovation.

While the neoclassical economics understood economic growth as the process of mere production capital accumulation, the evolutionary economics changed the focus towards the importance of knowledge and the institutional context in the production process. Conceptual and/or theoretical distinctions structure debates and understanding of societal developments. Neoclassical economics and evolutionary economics is one such theoretical dichotomy that is often used when refereeing to innovation. Nevertheless,

the boundaries between the two theoretical approaches are more porous than is left to be believed. Theoretical or conceptual approaches do not emerge independent of each other and important theoretical underpinnings would be missed if these two theories would be address separately and as opposing each other.

Drawing on evolutionary economics, the system of innovation perspective shifted the lens in considering the process of innovation; knowledge and learning are important for innovation (Lundvall 1992). The SI perspective aims at explaining the economic or innovation performance of a country or region in terms of how it got there, to understand the forces that moulded it. In this respect, the analysis is expressly dynamic. However, the NSI is frequently criticized for not being a well-defined, fully coherent theoretical framework (see Edquist 1997).

Innovation is largely addressed by the NSI as a relational process and it focuses on defining the system in terms of borders, actors and the relations between these actors. Knowledge and learning are most often the focus in systems of innovation literature (see for example Lundvall 1992) which has the following implications; firstly, economic development no longer understood only as input-output activity. Secondly, the economic activity is understood as a social and relational activity. And thirdly, therefore, the emphasis is placed on institutions and how economic agents interact. The efficiency of all these learning activities (that take place at different levels, between different levels, and between different types of actors) depends on the institutional set-up of an economy.

Since its emergence in the early 1980s the NSI framework developed tremendously but the very proliferation of the approach has increased the urgency of search for a unifying conceptual and methodological body of knowledge. The dissonance between the different approaches within the same framework is growing and it is getting more difficult to clearly specify the core of the NSI. The current changes in innovation studies are often addressed from two perspectives; on the one hand, the changes unfold incrementally to the extent that existing concepts are simply being improved or updated. On the other hand, there are those that claim that the NSI represents a paradigmatic change to innovation studies. The interdisciplinary character of the framework feeds into the ambiguities and fuzziness the framework is often accused for (Miettinen 2002).

The argument in brief

The general aim of this paper is to address the NSI framework as the interplay between two types of innovation systems, namely territorial-based innovation system and functional-based innovation system. The argument is that economic actors and their actions should be at the core of a NSI and not space and spatial categories. Following Bathelt and Glückler (2003), territoriality (or space) is here conceptualized as *perspective*, where territory is used to ask, *"particular questions about economic phenomena but space is not our primary object of knowledge."* (Bathelt and Glückler 2003: 124). I adopt this approach because the paper focuses on the interactions that lead to innovation, and not the territory.

It is argued that the innovation systems work through the introduction of knowledge into the economy and it requires active learning by all agents involved (Lundvall et al. 2002)1. The NSI framework adopts a broad approach to innovation addressing all factors that are having an impact on innovation but it also defines innovation not only an economic process but also as a social process. In this regard, in the following section I review some of the theoretical grounds of evolutionary economics that underpin the NSI and argue that the theoretical foundations of the framework lie in the neoclassical economics, evolutionary economics and institutional theory triangulation. Special attention will be paid to the evolutionary view of the firm (and firm behaviour). Two principles are at the core of the evolutionary economics: diversity and selection. Diversity and selection are crucial for an economy to evolve. The literature identifies several mechanisms of selection; Audretsch and Keilbach (2004) discuss entrepreneurship as an important mechanism in driving the selection process; Iammarino and McCann (2010) discusses the role of clusters in the selection process. This paper suggests that large firms are an important mechanism in driving the selection process hence in creating diversity of knowledge. The core of literature deals with the role of small and medium-sized firms for economic growth, while the role o large, international firms are modestly addressed. In a globalized knowledge-based economy, the role of multinational companies is increasingly recognized as a growing force. MNEs are considered to be vehicles of knowledge and technology flows across geographic boundaries. Large international companies have reached a level of maturity where location issues are not as critical as in the earlier stage. The more mature a company

[1] "Innovation systems work through the introduction of knowledge into the economy (and into the society at large). It requires active learning by individuals and organizations taking part in processes of innovation of different kinds." (Lundvall et al. 2002: 225)

(industry) it is the more geographically dispersed it is (Vernon 1966, Klepper 2010). Their market is a global one, and not a national one.

Based on these theoretical foundations, the following section will propose an alternative approach to the NSI. We propose to address the NSI as the interplay between two types of innovation systems; territorial-based systems of innovation relational to functional-based systems of innovation. The territorial-based SI is understood as a hierarchical system, vertically integrated and a closed system. The functional-based SI is understood as a network-based system, horizontally integrated and open system.

Empirically, the territorial versus the functional-based innovation systems types will be discussed by considering the case of the mobile telecommunication cluster in Skåne, Mobile Heights, where the focus will be placed on the role of Ericsson. The Mobile Heights case is used as a case to serve the following purposes: to study the interaction firm – university – public authorities, to study the role of the firm in the local innovation system and how it supports the local innovation/entrepreneurial activities, the interplay between different levels of innovation system, in this case the interplay between the national and regional innovation system, but also a firm's innovation system. For this purpose interviews were conducted. The interviews were semi-structured, involving a relatively fixed list of open-ended questions. Considering that the interviews were conducted with different types of actors, they are associated with different risks that should be acknowledged and preferably minimized in order to make the use of the commensurable. In the case of policy-makers, there is a risk that answers will be tailored to suit specific political objectives. In the case of firm representatives there is a risk that answers will avoid information of high relevance for the researcher's investigation but that are considered secret by the firm.

The paper ends with a conclusion answering to the following question; in which ways do institutions and policies embed (that is to say the territorial-based IS) the process of innovation (that is to say the functional-based IS)?

An evolutionary approach to national systems of innovation

The NSI emerged as a counter reaction to the neoclassical economics approach to innovation, escaping the linear vision of the innovation process as a sequence going from conception to commercialization. Inspired by the evolutionary economics (McKelvey 1997, Saviotti 1997), the NSI adopts instead a dynamic approach to innovation, stressing the importance of learning, interdependence, continuous feedback

loops and externalities. Knowledge and learning are at the core of the economic development and innovation the main driver of economic growth. The main building block of the NSI approach is that knowledge creation is a result of an interactive process across several firms (Lundvall and Maskell, 2000). More generally speaking, the systems of innovation framework focuses on the processes of innovation and the institutions supporting them adopting an evolutionary perspective.

The notion of territoriality as a significant site/factor for innovation is advocated by several concepts or perspectives. Some of these perspectives are: national systems of innovation, regional systems of innovation, learning regions, industrial districts etc. Moulaert and Sekia (1999) label this family of concepts or perspectives as the territorial innovation models (TIMs) (in Lagendijk 2001). Lagendijk (1997) depicts the stages through which these concepts and other similar ones followed in their development. Originally, concepts emerged as descriptive-analytical frameworks to explain innovation and economic development from different perspectives. When in their mature phase, argues Lagendijk (2001), the concepts or frameworks gained explanatory valued. This stage is followed by a prescriptive-strategic approach; that is these concepts enter policy making and transform into normative models for economic development/growth and boosting innovation.

The literature differentiates between several types of innovation systems (IS). The different types are not contradicting each other, but are complementing approaches addressing innovation/technological development as spatial and temporal bound. National and regional systems of innovation focus on the conditions of innovation in a territory and adopt a historical perspective, while later versions, such as the spatial IS approach, took a step further by exhibiting borders and the importance of locality and by emphasising the importance of the external relations of actors. The regional innovation systems emerged as a reaction to the national innovation systems, considering that the national level is not an appropriate level of analysing innovation. Nevertheless, an RIS is part of a national one, as well as it can be part of a global system. On its turn, a RIS is usually including parts of several/different sectoral systems. The territorial-based innovation system framework, such as the regional and local innovation system argues for the importance of regional and local differences for economic performance. The assumption is that economic/technological development is spatially bounded (as well as temporally) and that proximity is conducive for learning and innovation. Within the innovation system perspective, location-specific factors (such as the technological base) become important for the firms' competitiveness (Amin

and Cohendet 2004). The systems of innovation literature emphasises different geographical levels when addressing the conditions for innovation.

Systems of innovation are also defined according to specific technological fields or sectoral. These types of systems of innovation are delimited to specific technologica fields or product ares. Carlsson and Stankiewicz (1995) formulated the "technological systems" approach while Breschi and Malerba (1997) formulated a "sectoral innovation system". The main difference between the two approaches is that the former focuses on generic technologies while the latter on industries (Carlsson 1997).

The system of innovation approach has four basic conceptual underpinnings. First, economic behaviour rests on institutional foundations and the approach highlights the importance of institutions. Secondly, learning is the most important process and knowledge the most important resource. Innovation is in this context understood as an interactive process. Third, competitive advantage results from variety and specialization and it presents elements of path-dependency. Forth, innovation is a systemic process, hence all components of the system and the relation between these components should be considered and addressed within the system boundaries; "…systems are defined by components interacting within boundaries" (Metcalfe 2004: 18). Hence, the system approach to innovation refers to three components of a system of innovation: actors, networks and institutions. System dynamics are analyzed in relation to these three actors; how the actors enter the system, how they interact and form networks, and how institutions constraints or empowers the other two actors' behaviour and activity, as well how institutions are formed and changed (or preserved).

The view of economics and technological advance as an evolutionary process is not a new idea (Dosi and Nelson 2009). The evolutionary theories have two main characteristics; firstly, it explains the movement of something over time, namely it explains the status of something in terms of how it got there; secondly, it explains in terms of learning and discoveries, and selection mechanisms (Dosi and Nelson 1994). The evolutionary economics underlined that the development of new technology is path dependent, interactive and localized. Learning and novelties are produced through adaptation and variation, which fundamental building block of the evolutionary theory. On one hand, agents follow rules of behaviour which are context specific and also event-independent; on the other hand, the theory recognizes that agents are capable of "innovative" behaviour, experimenting and introducing new rules of behaviour. This assumption suggests that the evolutionary theories have a strong focus on the agent,

who has the capability to change or adapt to the system; institutions are all adapting to specific circumstances and there is no expectation of system optimality (Cantwell et al 2010). Cohen and Levinthal (1990) used the notion of *absorptive capacity* to refer to a firm's ability to recognize the value of new, external knowledge, assimilate it and apply it. A firm's absorptive capacity it is critical for its innovative capability[2].

Furthermore, this implies that the system is less probabilistic that it was implied by the neoclassical theory[3]. In the neoclassical theory the agent acts rationally and takes the actor's objectives and constraints as given. In an evolutionary perspective, the actor acts more subjective than objective. The analysis is more orientated towards understanding how the social values and institutions affect the choices of the agent. Understanding the particular local context (defined in terms of social values and institutions) in which the agent acts are key aspects from an evolutionary perspective. The context in which the agent acts is perceived as complex and presumed as familiar only to a certain extent. Likewise, the NSI framework argues that there are social, cultural and institutional influences on innovation which have an important bearing on how successful a firm is likely to be.

In this context, Pyka (2002) identifies three main aspects evolutionary economists claim to be of importance for innovation (and economic development at large). Evolutionary theory wants to explain how novelty emerges and diffuses. In this process, uncertainty plays an important role. Evolutionary economists reject therefore the neo-classical assumption of perfect rationality, and invoke instead the concepts of bounded and procedural rationality (the actors are characterised by incomplete knowledge and capabilities). The second point that evolutionary theory makes is the important role of heterogeneity and variety as sources for novelty and development. Finally, the evolutionary theory invokes the time dimension in which learning and the emerging of novelties take place.

Often the framework refers to evolutionary economics and institutional economics as being more or less indistinguishable (Boschma and Frenken 2006 make the same observation regarding economic geographers). To address this triangulation –

[2] Cohen and Levinthal (1990) make an interesting remark noticing that the psychology literature is defining rather similar absorptive capacity and creative capacity.
[3] In the sense that the neoclassical theory argued that agents in the system behave rational – all agents make decisions to maximize their utility. This assumed, than we have a probabilistic system.

neoclassical economics-evolutionary economics-institutional economics- I will follow the framework proposed by Boschma and Frenken (2006) and address the following three issues: the usefulness of formal modelling, the assumption debate, and finally the conceptualization of time.

The use of formal modelling unifies neoclassical and evolutionary economics but it is in opposition with the institutional economics. Institutional economics are very much against any kind of modelling; it argues for the importance of the contextual nature of economic and social life (Martin 2000, North 1990, Scott 2004). Applying an institutionalist approach to innovation process means focus on the place-specific qualitative factors (culture and institutions).

Secondly, the three approaches are built upon different assumptions. Evolutionary and institutional approaches argue that agents have bounded rationality and are influenced in their decisions but routines and institutions (Dosi and Nelson 1994). Neoclassical economics depicts the economic agents as driven by utility-maximization implying therefore an exogenous and given context. The main critique the evolutionary and institutional economics bring to the neoclassical theory is that it ignores the contextuality of human action; hence the importance of routines and institutions. Innovation systems employ economic action as embedded in structures of social relations. Accordingly, innovation is analysed as a contextual and relational process. This is also supported by the fact that the NSI strongly focuses on the growing importance of knowledge and learning within the economy (Lundvall and Johnson 1994). Knowledge is context specific and embedded in people, meaning that is social but is also a historical product, while learning is a social and interactive process. In this context one can anchor the NSI interest for the role of formal and informal institutions as the context for any economic activity, but also the fact that it is placed in time and place.

Finally, evolutionary economics adopts a historical perspective to explaining the current state of affairs and it criticizes the neoclassical theory for its static analysis. Some branches of institutional economics might appear static in their analysis; however they are largely evolutionary in character and often deal with institutional change. Institutional approaches are occasionally presented as static when one looks at how context/place-specific institutions influence the behaviour of the different actors. Such an analysis might appear static, but I argue that that depends on what is studied.

Institutional economics don't claim that institutions are static; institutions are rarely subject to major changes (institutions are to guarantee stability and a major change would threaten the stability of the system; therefore major changes are rare) but they are always subject to small incremental changes.

The nucleus of an innovation system is the firm. Innovation is the result of the activity of the firm. Traditionally, the firm is addressed from the perspective of the resource-based view of the firm originated from Penrose (1959) or the competence-based theory (Richardson 1972, Winter 1988). The key insight of systems of innovation studies (or innovation studies more general) is that firms do not innovate in isolation and innovation by firms can not be understood as an independent decision-making at the firm level. Hence, for a firm to innovate it needs to be supported by a context that fosters innovation. A firm's innovative strategy is shaped by contextual factors which are often considered to be specific to a geographical unit (local, regional or national context).

According to the evolutionary economics (Nelson and Winter 1982), accumulated knowledge (experience knowledge and tacit knowledge) and learning at the organizational level (the firm level) take the form of *routines*, and makes therefore routines idiosyncratic to the firm. As Dosi and Nelson (2009) stress, using *routines* as units of analysis recognizes the *multi-person nature* of the way firms and organizations work. Hence, routines are the (collective) capability of the firm; it is what has been learned by the organization. There is an ongoing discussion on organizational learning and if organizations can learn (i.e. Senge 1993, Argyris and Schön 1999) and the literature on routines partially touches upon this issue of organizational learning. As addressed by Nelson and Winter (1982) routines (a) embody the memory of problem solving repertoire of an organization; (b) entail mechanisms of governance for potential conflicts; (c) might involve "meta-routines". From this perspective, one might argue that routines might be seen as firm strategies designed (Dosi and Nelson compare routines with recipes) to deal with the more day-to-day activity of the firm.

Firms rely on organizational routines in their productive and decision-making process; this is one of the main premises of the evolutionary economics. Because routines are based on tacit and experienced knowledge, this makes them difficult to be imitated by other firms. It follows that economic development is described in terms of changes in the time-space distribution of routines; hence the firm rather than the locality is the unit of analysis (Frenken and Boschma 2007). This is if one adopts a firm-centred approach.

The innovation literature in economics argues that firms employ a broad range of forms, sources and outcomes of innovation processes (Nelson 1991, Dosi 1992, Dosi and Marengo 2007). As a process, innovation is relatively routinised and processed within the existing hierarchical bureaucracies (Audretsch and Keilbach 2004). Following this literature, the system approach to innovation strongly argues for a holistic understanding of the innovation process, where all components are to be considered and, moreover, the relationships between the elements need also to be included in the analysis. Locality becomes central again as a system requires a specification of the boundaries. Because learning is considered as a central process, this makes institutions important to the systems. Institutions are to be socially and culturally bounded, and therefore locality becomes again important.

The role and size of firms is a source of puzzles for industrial dynamics and economic theory in general (Dosi et al 1995). The role of large firms has been long addressed (REF) but the innovation and innovation system literature has almost exclusively addressed only the role of small- and medium-sized firms, as well as on the role of spin-offs, start-ups or the role of entrepreneurs. The importance of large firms for a system of innovation is increasingly gaining acknowledgement especially in the context of a globalized world. Older, larger firms, as Freeman (1982) suggests, come in their maturity to dominate their environments rather than adjust to them. Large firms exert important positive externalities on the surrounding environment, both on the policy level and on other firms. Much of the literature focuses on the opportunities and constraints of the institutional landscape for firms, but less research is on the firm as an active agent and the firm's capacity on adjusting to and altering the institutional environment. Therefore, there is a strong focus on the territory, i.e. the importance of location. Allied to this, the literature on innovation systems though it stresses the interrelationships between firms and the broader (institutional) context, focuses mainly on the impact of local (national, regional, local) institutions and other collective (social/cultural) determinants on firms (economic agents) and their behaviour. The role of firms as active agents and the impact of the firms' initiatives on the wider environment is largely ignored (Cantwell et al 2010). Knowledge generation and innovation has become more network-dependent. I argue therefore that multinational companies are becoming central players for the competitiveness of a national system of innovation. Recent research has emphasised the increasing appreciation of the role of multinationals in the generation of technology, along with a trend for MNEs to establish internal and external networks for innovation (Cantwell and Iammarino 2003). The

basic assumption is that external knowledge is critical for the innovation process (Cohen and Levinthal 1990), and therefore the interaction of firms and institutions is of importance.

In addition, it is argued that innovation is the result of the interaction between individuals/actors. Hence, an actor perspective is adopted. This makes the approach highly complex as different actors (firms and individuals) read, understand and use information differently and as Metcalfe (2004) argues "here we find one of the principle sources of variation in the innovation process, innovations are conceived in individual minds and these minds differ." The IS is at the same time a theory of innovation as strong locational geographical component and of innovation as a social and relational process where the interaction between individuals (and firms) are the engine of competitive advantage.

The interplay between territorial-based IS and functional-based IS

Within this framework, a tension can be presumed to rise between firm and territoriality. I will address this issue as the dichotomy between a territorial-based innovation system and functional-based innovation system. The fundamental difference between these two types of innovation system is that the territorial one explains innovation as dependent on factors or conditions that are specific to a territory (the importance of place) while the second type addresses the functionality of the system, what do the components of the system actually do, and what it is achieved. Innovation systems are complex entities which makes it difficult to delimitate the importance of the local versus trans-local elements in them (Oinas and Malecki 2002).

The territorial-based IS concentrates on the internal dynamics of the system. It focuses on the processes, interactions, feedback loops that are within the boundaries of the system. But it is insufficient to only address the internal dynamics. Systems do not exist or act in isolation but they are in permanent interaction with other systems. The actors of the system are most likely to go beyond the boundaries of the system and establish networks with external actors. Therefore, factors that are exogenous to the system are fundamental to understanding the dynamics of a system.

The argument is that there is no such thing as SI (national, regional or international) that could be organize and/or self-organize according to a territorial unit. This is not to reject the existence of systems of innovation, but it is a rejection of systems of innovation as systems that are constructed and steered within a territory. A functional perspective

does not reject the view of innovation as a systemic process and of a system with boundaries, but boundaries are established by formal and informal institutions, interests, etc. and not because the activity happens to be contained by a territory.

In order to understand the tension between the territorial- and functional-based systems of innovation, in the following it will be provided a review of the geography of innovation literature. Iammarino and MacCann (2006) identify four hypotheses that dominate the current geography of innovation literature.

Firstly, *the contemporary geography of innovation is essentially a geography of the currently more innovative sectors of the economy*. This hypothesis takes inspiration from the life cycle approach to economic growth, hence the dominance of different sectors of economic activity differs over time. Kuznets (1930) stressed that economic growth is characterized by shifts in the relative importance of leading industries, while Clark (1940) reaffirmed this point at a more aggregated level by linking economic growth to the rise and decline of major industries or sectors.

Secondly, *the contemporary geography of innovation is essentially a result of spatial differences in the phases of product or profit cycles.* During a product or profit life cycle, importance of place varies (Vernon 1966, Freeman 1978, Markusen 1985). If in the early phases proximity to skilled labour and subcontractors are crucial, later on in the mature phase location is driven by other factors such as transport costs and therefore geographical dispersion is very likely to occur. The assumption this hypothesis makes is that the innovation firms are largely dynamic in their choice of location (Iammarino and MacCann 2006).

Third, *the contemporary geography of innovation is essentially the outcome of variations in the characteristics between different places which lead to differences in the geography of creativity and entrepreneurship*. Some places are more attractive, creative and dynamic than other. For example, urban areas are considered to be the locus of creativity and entrepreneurship, where new ideas are born and which attract highly qualified and skilled labour force. This hypothesis can be considered to be in relation with the first named hypothesis.

Forth, *the contemporary geography of innovation is essentially a result of the fact that innovation is most likely to occur in small and medium-sized enterprises, whose spatial patterns happen to be uneven.* Based on the ideas of Schumpeter, the contemporary

geography of innovation contends that small and medium-sized enterprises are necessary condition for long-term economic development.

In the following, a number of shortcomings regarding the territorial-based system of innovation will be addressed while at the same time a tentative is made to provide an outline of the functional-based IS. The two types of IS are however not in opposition but rather complementary.

Firstly, the firm is the locus of the system and the performance of the firms is usually allocated to their location in a territory/place. The IS literature reasons in terms of the interrelationships between firms and their environments, the focus lying in the environment and system level, rather than the effects of the firm intentions and/or actions on the environment/system (Cantwell et al 2010). Nelson and Winter (1982) characterized firms as being highly heterogeneous in terms of capabilities, strategies and routines. Therefore, this paper adopts the actor perspective and places the action and behaviour of companies at the centre of the analysis.

Secondly, knowledge and learning are considered only within the boundaries of the system, and analysis the emergence and development of a system only by focusing to a geographical area (i.e. the Swedish IS). Vernon (1966, p. 192) argued that "*the entrepreneur's consciousness of and responsiveness to opportunity are a function of ease of communication; and further, that ease of communication is a function of geographical proximity."* Accordingly, argues Vernon (1966), knowledge is an independent variable in the decision-making process. The role of geographical proximity tends to be overestimated, networks being also confined to a particular geographical area. But networks are by definition a-spatial entities (Ter Wal & Boschma 2008, Iammarino and McCann 2006) and are formed to serve a function. Networks as a form of economic governance, pushes the concept of proximity beyond just a spatial dimension (Iammarino and McCann 2006). Networks are not bounded within a territoriality, aspects of location and proximity are not imperative for the very existence of a network. By linking the system of innovation literature with the network theory a dynamic perspective is therefore adopted, overcoming the predominantly static nature of the territorial approach to innovation systems. Furthermore, with the firm at the core of the analysis, the dynamic and functional approach is further accentuated.

Lastly, the aspect of territoriality is not fully addressed. The notion of NSI refers to a territory that is defined a priori within its national borders. Space appears to be conceptualized as a container which confines and determines economic activity. Often, territory appears to be conceptualized independently from economic action. Yet, Boschma and Frenken (2006) argue that evolutionary approaches to economic geography make use of a concept of *neutral space*, however a historical space, defined by path dependency and bounded rationality (???). Is not the place in itself that makes actors to agglomerate or cluster, but there are other forces that attract actors to agglomerate somewhere in space. The object of study is therefore not the place but the factors that make the different actors to locate near each other. These factors make a place interesting, not the place in itself which without these factors is a neutral space. Furthermore, another drawback is that it considers only the opportunities that exist locally without considering the opportunities outside the borders of the system and how actors/firms take advantage of those.

The NSI framework argues that the most important part of the heterogeneity of innovation strategies is between rather than within such systems (Srholec and Verspagen 2008). Srholec and Verspagen (2008) in a study assessing heterogeneity of the innovation process and using data from the 3rd Community Innovation Survey in 13 countries concluded that sectors and countries matter to a certain extent, but heterogeneity is the result by the variance among firms within either sector or country.

The focus of the innovation system framework has been to identify the specificity of a country/region/sector/technological system – that is it presents a homogenous picture of the system, while there is almost no attention paid to the regional and sectoral differences within a country and firm heterogeneity (cf. Nelson 1991). I argue that this is a fall of adopting a territorial perspective on innovation. The search for what is the certain specificity of a national system of innovation is explained by the fact that the innovation activity is determined by institutions (Lundvall 1992, Nelson 1993, Edquist 1997). Institutions are defined as "*sets of common habits, norms, and routines, established practices, rules, or laws that regulate the relations and interactions between individuals, groups, and organizations*" (Edquist and Johnson 1997). The NSI framework is concerned with the institutional regimes that support innovation. The assumption is that the innovative capacity of an economy is influenced by the institutional environment. The main assumption is the institutional set-up of the economy is crucial

for innovation. Furthermore, the NIS is concerned how this institutional environments varies across space, and how it shapes local economic outcomes.

Territorial-base IS share the belief that the innovation capacity of a region can be influenced by innovation policies and supporting institutional and regulatory frameworks. Furthermore, the territorial based IS it is argued to propose a narrow and one sided view on the importance of location for firms and economics activities more generally. Scholars have examined the role of firms in creating spatial attributes (Scott 1998) or how industries create their on regions (Storper and Walker 1989). Hence, firms and industries are do not just act according to spatial attributes and they don't behave under the total influence of culture and institutions, but they are active players and agents of institutional and place transformation and change. As Bathelt and Glückler (2003) argue, in this view, places are seen as socially constructed.

The Mobile Heights case

In the following, the case of the of the mobile telecommunication cluster in Skåne – Mobile Heights will be presented. The aim of the case is to address the interplay between two IS types earlier discussed. The case is used to serve two purposes; to address the different levels and actors which come into interaction; but also to observe the role of large companies in relation to their local environment.

In 2007 Lund Technical University and Ericsson initiated a collaboration having two purposes. Lund Technical University (LTH) was experiencing a decline trend in terms of students applying to their engineering programmes. A problem for the university's future but not only, also for the local companies. Mobile telecommunication companies are knowledge intensive companies that need to have access to a skilled and highly educated labour force. Secondly, there was an idea that despite a flourishing activity in the region little was known outside the regional borders. Therefore, an initiative was taken by Ericsson and LTH to establish Mobile Heights with these two aims: to attract more students and to raise the awareness about the local cluster outside the regional borders.

The initiative quickly captured the attention of the regional authority Region Skåne. Mobile Heights fitted within their strategy. The Skåne regional council highly prioritise cluster-building, and it also explores and implements the so-called innovation platforms as a new policy tool. What is an innovation platform? They are also referred to as the white-spaces between cluster fields where innovation opportunities are considered to

lie (REF). It is no longer only about creating clusters but also about creating platforms or arenas for the existing clusters to cross-fertilize. It highlights the importance of identifying fields or clusters with related knowledge and the importance of collaboration for new knowledge and new opportunities to emerge. New knowledge and new opportunities are emerging through existing knowledge and technologies. The Mobile Heights Business Centre functions as an Innovation Platform – the companies that are created are largely applying mobile telecommunication solutions are applied to other fields, mainly health and Cleantech. This is perceived as a tool for allowing new start-ups to emerge and literature shows that start-ups introduce variety into a regional economy which might lead to long-term economic growth (Boschma and Frenken 2006, Andersson and Koster 2011).

So, while for Region Skåne collaboration with Mobile Heights fitted to their policy, for MH the presence of Region Skåne implied that funds were secured in the form of European Structural Funds, but also from other public actors such and Vinnova, the Swedish innovation agency or Tillväxtverket (because financing from these actors is based on a triple helix principle). Nevertheless, the involvement of the regional authorities is also experienced as problem for the future of the project. For example, Ericsson experiences the collaboration with policy makers as problematic; Mobile Heights was initiated as a project with well formulated goals and a well defined time frame. But Mobile Heights today transformed from a project into an autonomous organization with loose goals and no determinate time frame. Ericsson works with short-term projects where results are measurable. Mobile Heights is not such a project anymore and Ericsson questions their future membership.

In line with Schumpeter, there are an extensive number of studies arguing for the positive relationship between start-ups and regional economic development. The region houses some of the most successful Swedish companies. This is an important factor for the survival and success of the new start-ups. The Mobile Heights Business Centre has as main role to support entrepreneurs to materialize their business idea. Together with representatives from the industry, they form a support net of business advisers for entrepreneurs and start-ups. Furthermore, the requirement the MHBC poses onto the participants in their programme for entrepreneurs is that the new firms to be established in the region. They are expected to contribute to the local cluster considering that they benefit of help from the local innovation system (in an interview with a MHBC representative the business centre was portrait as part of the Skåne

innovation system). The main member companies have rather different opinions regarding this particular issue; Ericsson was rather indifferent explaining that their mainly (if not only) reason to be present in Lund is the proximity to the university. ST Ericsson expressed great interest in the local ecosystem. Sony Ericsson (Sony Mobile today) appears to have most to gain from a flourishing of new companies in the region (as it was discussed in the interviews with Ericsson and ST Ericsson).

Looking at the role of firms for local economies, Ericsson is often looked upon as a crucial player in the local telecommunication industry[4]. Ericsson has a long tradition of collaboration with the university. As a research intensive company the company has always been in need of highly educated labour force as well as access to top-quality research. One of the main criteria Ericsson has when choosing a location is proximity to university and possibilities of research collaborations. Proximity to the university is an important factor for plant location decision for Ericsson[5]. Access to a high-educated labour market and latest high-quality research are arguing for this proximity. From this perspective, one can also consider the influence of Ericsson upon the Swedish engineering education, how it influenced and what impact it had. Therefore the collaboration is mutually positive.

The university is an important actor within the local system and adopts an active role as an economic engine and acts to a large extent as what Berman (2012) calls a *market university*. The close collaboration with a company as Ericsson contributed to the university's behaviour. The research carried out at LTH both attracted Ericsson to Lund (the radio education and research) but was also moulded by Ericsson who is actively involved both in education and research programmes (teaching and financing). The cooperation with the university takes place mainly through sponsorships of research centres or projects. Research centres that Ericsson is financing are the Department of Electrical and Information Technology, as well as the Research Centre System Design on Silicon (via Vinnova, FP 7).

[4] The role of Ericsson for the local mobile cluster can be looked upon both from a positive side but also from a negative one. On one hand, it is probably the initiator of the flourishing activity since the 1980 when it located in Lund. On the other hand, there are voices which also pinpoint the fact that the presence of Ericsson in the region leaves little room for new start-ups and new comers to establish themselves. In this regard, one can wonder if their presence in MHBC and opening their patent bank is not an action taken by Ericsson to change this image.

[5] It is important to mention that in the 1990s Ericsson established subsidiaries in most of the Swedish university towns.

Ericsson and LTH were probably the two main actors that initiated and supported growth of the ICT industry in the Lund/Malmö region. The university brought Ericsson to Lund and from the very beginning there was a close cooperation between them. Research and education was carried out in close cooperation with Ericsson, which beside its expertise it was also an important investor.

Macdonald (1987) emphasis the great need high-tech companies have to cooperate with other actors, such as the university, but primarily with other companies. However, the interview with the Ericsson Lund unit has primarily acknowledged and emphasised the importance of the relation with the university; and it neglected the relation with other companies. Several reasons/explanation could be mentioned. Ericsson is highly internationalized and thinks mainly global than local. The plant located in Lund is research orientated and therefore they are interested in knowledge produced at the university, much more than knowledge developed in other companies. In 2010, Ericsson opened up their patent bank (about 450 patents and more are to be added) and made it available for licensing. Through MHBC, local entrepreneurs can pick up a patent and get assistance and support both from business advisers but also from the industry (Ericsson, Sony Ericsson, ST Ericsson, Telia Sonera and others). The MHBC organizes regular meetings (called "Power Hours") where the entrepreneurs have the opportunity to present their ideas to the industry (where Ericsson is one of the members) and receive feedback. The kind of help Ericsson is providing to the entrepreneurs varies from case to case; but is most often that they give feedback on the viability of the idea but also by putting them in contact with relevant actors from their networks. Since 2009 up to today, a number of about 30 new companies emerged through the MHBC (some random examples are Verifyter, Saplo, Qubulus, Malvacom, Timezynk, Trialbee, Zaplox). Due to the fact that Ericsson Lund is mainly research orientated there are scarce opportunities for new business to be created that are of relevance for Ericsson (Sony Ericsson supports most new firms). Therefore, the hitherto outcomes of MHBC are considered as rather irrelevant by Ericsson.

Conclusive discussion

The aim of the paper was to address the national systems of innovation perspective from an alternative perspective as the interplay a territorial-based SI and a functional-based SI. In very general terms the paper is about the relationships between innovation, growth and geography, a relationship that has attracted much attention.

The paper starts by providing an evolutionary approach to NSI, but also addressing it in the light of the neoclassical economics and institutional economics. The three strands of literature are forming the theoretical underpinnings of the approach. Placing the NSI within a theoretical context, the territorial- and functional-based SI are introduced. It is argued that a territorial focus seems to dominate the approach and several shortcomings are presented. This considered, the paper argues for a more functional orientated approach to innovation systems and adopts as a result an actor perspective. For this purpose, a case is presented, namely the mobile cluster in Skåne, Mobile Heights. From the case, I will now focus on two questions regarding the intentions or interests of large companies towards their local innovation system and secondly, the intension and interests of the local authorities.

To what extent are companies like Ericsson or Sony interested in the local market and in what way? Their home market is primarily international, and there are different factors for why companies like Ericsson chose to establish a unit at a specific locality. For Ericsson the presence of a university was the central factor behind their decision to establish in Lund. Still today, the presence in the proximity and the collaboration with the university is what explains the presence of Ericsson in Lund. In this context, Ericsson is one of the main actors in the process of converting academic research in (local) commercial innovation. Nevertheless, the patent policy driven by Ericsson can often be a barrier in the appropriation of the academic research by other companies or to commercialization. Any other regional factors are of at least secondary importance. Other companies such as ST Ericsson stressed on the other hand a strong regional interest and commitment to the regional innovation system[6]. Without going any deeper into this discussion, for the purpose of the present paper the aim is to highlight the companies employ different strategies in relation to their regional context. By employing different strategies they also behave differently in relation to their context and having therefore different impacts.

The strategy of Region Skåne needs also to be paid further attention. The adopted strategy was to identify and focus on the already existing clusters; the strategy therefore was not to create new clusters but to focus on the already existing ones. Further development and to enable new areas to emerge is carried out by focusing on innovation

[6] The ST Ericsson representative interviewed preferred to use the term of ecosystem instead of innovation system. The concept of ecosystem is used in the business literature, but is almost inexistent in the innovation studies.

platforms. As mentioned, innovation platforms are the space between clusters where innovation opportunities are considered to lie. This makes one wonder if this does not imply new roles to be adopted by policy makers. Regarding the role of policy makers a question that also should be asked is if regional authorities are to formulate visions or strategies for the organization or for a territory. It is obvious that firms formulate strategies for their own organizations, but the regional authorities (in this case Region Skåne) appear to formulate a vision for the territory.

In conclusion, the strategy of the actors involved in the establishment of the Mobile Heights can be summarized as a function of initial conditions and use of relevant concepts [F (initial conditions, concepts)]. The starting point of the MH was the already existing local activity in the field. For the LTH and Ericsson to succeed in securing financial means it was important to pack the idea to make it sealable – that is to use the right concepts to attract the support of the public authorities. Same strategy was used by the local authorities in order to secure the support of national and international financial bodies.

Policy makers are formulating strategies or visions for a territory with the belief that he activities that take place within the defined territory can be planned and steered. Firms, on the other hand, formulate strategies (are firms formulating visions?) for how to act given specific internal and external conditions. There is not always an interplay between these two levels and sometimes they can be in conflict.

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