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**National Systems of Innovation and Entrepreneurship:  
In Search of a Missing Link**

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# NATIONAL SYSTEMS OF INNOVATION AND ENTREPRENEURSHIP: IN SEARCH OF A MISSING LINK<sup>12</sup>

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## Abstract

The literature on national systems of innovation (NIS) has neglected the issue of entrepreneurship because of several incompatibilities between the two notions. The Schumpeterian legacy, the current person-centric view of entrepreneurship, and methodological problems related to treating entrepreneurship at the macro-level, have made it difficult to integrate entrepreneurship into the NIS perspective. At national level it is more appropriate to treat entrepreneurship as a ‘property’ (dimension) of NIS.

In order to link NIS and entrepreneurship we must establish a common conceptual basis. Our argument is that the functional view of NIS and entrepreneurship presents a common basis for such an approach. We develop criteria for the entrepreneurial NIS which we define as being those that can change balance between individual and cooperative entrepreneurship; that enhance both the opportunity and skill aspects of entrepreneurship; and that can balance generation of uncertainty with support to business models and other organisations which pool uncertainty.

From the NIS perspective, we explain entrepreneurship as a systemic phenomenon driven by complementarities between technological, market and institutional opportunities. This framework builds on three research traditions in the entrepreneurship/NIS literature (Schumpeterian, Kirznerian and Listian) which jointly form a multi-level, multi-dimensional framework for understanding entrepreneurship from a NIS perspective. This framework could be useful as a heuristic for empirical research on entrepreneurship. Finally, we analyse policies for entrepreneurship and find that they are highly dependent on underlying and previously discussed conceptions of entrepreneurship.

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## 1. INTRODUCTION

The literature on national innovation systems (NIS) has largely neglected the issue of entrepreneurship. A survey of the major contributions (Freeman, 1987; Nelson, 1993; Lundvall, 1992, Edquist, 1997) shows that entrepreneurship is largely absent in these works; there is only one reference that explicitly links NIS with entrepreneurship (see Golden and Higgins, 2003). At the same time, there has been an explosion of interest in the phenomenon, from a proliferation of educational courses on entrepreneurship to its measurement on a world-wide scale by Global Entrepreneurship Monitor (GEM, 2004) reports. Moreover, it has been argued that entrepreneurship has profoundly changed the nature of the contemporary capitalist system, transforming it from the 'managed economy', which flourished for most of the 20th century, to an 'entrepreneurial economy' (Audretsch and Turik, 2001b). The basis of this trend is the revival world-wide of small business and self-employment. From a long-term structural perspective this shift could be interpreted as the transition from the fourth to the fifth Kondratiev wave (Freeman and Perez, 1988; Perez, 2003) which was accompanied by a variety of techno-economic changes, such as reduced importance of scale economies in many sectors, increasing uncertainty regarding market and technological opportunities, and thus institutional uncertainty. All these changes are structurally favourable for the growth of entrepreneurship. On the other hand, a proliferation of market modes of coordination has been accompanied by increasing doubts about whether, in light of globalization, NIS remains the dominant framework for nurturing innovation processes (Howells, 2003). Although views on this are highly divergent (for example, compare Porter (1990), Whitley (2000), and Carlsson, (2006) vs Ohmae (1995)), the debate has probably undermined the relevance and usefulness of NIS as a concept by its emphasis on local clusters.

The escalation in research on entrepreneurship has not qualitatively improved our understanding of how entrepreneurship contributes to growth. Due to its dominant focus on individual entrepreneurship, traditional research in this area has produced diminishing returns (Shane and Venkataraman, 2000). According to Swedberg (2000: 32; see also Gartner, 1988)

psychological studies of the entrepreneurship have ... a fairly low status among social scientists who study entrepreneurship, and the main reason for this is that the attempt to single out one or several psychological traits as typical for the entrepreneurial personality is generally considered to have failed. That such a personality exists in the first place is also seriously doubted.

In contrast, Shane (2003: 61) argues that 'the entrepreneurship literature has shown that the people who engage in entrepreneurial activity are not randomly determined. Certain individual level characteristics are associated with the decisions to engage in entrepreneurship activity'. Although the role of personality traits remains unresolved it has created several myths on entrepreneurship that are all closely related to the idea of person centric entrepreneurship (NCOE, 2001, 2002). A thematic issue of *Research Policy* (see Shane and Venkataraman, 2003) pointed to the limitations of this line of research and argued for a better understanding of entrepreneurship systems and networks. Scholars have begun to question the widely held view that entrepreneurs, as

economic actors, are isolated and are depicting them as being tied through their social relationships to a broader network of actors. (For a review of this literature see Hoang and Antoncic, 2003.)

The person centric view of entrepreneurship has led to a very narrow policy focus on what it is and how it should be supported. By reducing the phenomenon to individual small firms and factors of their environment, a line of research is emerging in which the key parameters are the growth of new small firms and the obstacles they face. As this is a rather narrow view, focusing on only one dimension of entrepreneurship development, it is difficult to place the results of this work within a meaningful theoretical or conceptual framework (see, for example, GEM, 2004).

On the other hand, analysis of NIS that does not take account of entrepreneurship as an important function, is rendering this concept increasingly irrelevant. NIS is the essential framework that ensures a balance between ‘creation’ and ‘destruction’, and the role of entrepreneurship in this process is critical. The absence of links between NIS and entrepreneurship is highly unsatisfactory for both concepts. The absence of broader contextual factors and the dominance of person centric lines of research have limited our understanding of how contextual and system level variables affect entrepreneurship, which is the basic rationale for this paper. Our aim is to critically review the relationship between the NIS and entrepreneurship literatures and attempt to show how they can be integrated. We consider this essential for three reasons. First, a narrow person centric view of entrepreneurship has become increasingly irrelevant as the focus is shifting towards systemic or network elements of firm growth and formation. Second, entrepreneurship is a vital function of NIS and if we are to understand the dynamics of different innovation systems we must take explicit account of this dimension. Third, narrowly focused entrepreneurship policies risk irrelevance unless they encompass the systemic and network aspects of entrepreneurship.

First, we discuss why the NIS literature does not address the issue of entrepreneurship (Section 2). Second, we analyse the differences between the functional and currently dominant institutional views on entrepreneurship and NIS (section 3). We argue that the functional view of NIS and entrepreneurship provides a common base which enables integration of these concepts. We develop some criteria on which NIS could be considered entrepreneurial (Section 4). Entrepreneurial NIS are those that are able to change the balance between creative (individual) and cooperative entrepreneurship; that enhance the market opportunities and the skills aspects of entrepreneurship; and, that balance generation of uncertainty with support for business models and organisations which pool uncertainty. In Section five, we analyse entrepreneurship from an NIS perspective in which entrepreneurship is a systemic (network) phenomenon, and emerges as an outcome of interaction (alignment) between technological, market and institutional opportunities.

This framework builds on three research traditions in the entrepreneurship/NIS literature (Schumpeterian, Kirznerian and Listian) which together form a multi-level and multi-dimensional framework for understanding entrepreneurship from an NIS perspective.

Section 6 analyses policies for entrepreneurship and finds that they are highly dependent on underlying and previously discussed conceptions of entrepreneurship. Finally, we summarise the key arguments and suggest issues for further research.

## **2. NIS AND ENTREPRENEURSHIP: WHY THERE IS NO EXPLICIT LINK?**

It may seem somewhat paradoxical that research on NIS, which has been largely inspired by the Schumpeterian theory of economic development, ignores the key agent in this theory – entrepreneurship. Indeed, as E.S. Andersen (1994) argues, there is wide acceptance of Schumpeter's views and yet he seems to be relegated to the role of 'footnote economist'. On the other hand, this may not be paradoxical if we take into account that Schumpeter abstracted from the institutional context of the market economy, which is so central to the NIS approach. In this respect, Schumpeter has much in common with Austrian economists who also ignored the complexities of institutional set ups in explaining entrepreneurship. For Schumpeter, as Harvey and Metcalfe (2005: 5-6) point out, 'markets are there without explanation even though one of the classes of possible new combinations that he identifies is the discovery of new markets. Rather Schumpeter's concern is with why that given system produces continuous economic change'. They also point out that Kirzner looks at the establishment of market order while Schumpeter looks at the transformation of market order (Harvey and Metcalfe, 2005: 9). However, in both cases they assume that market order itself is not an issue. For example, Schumpeter neglects the development of credit and financial system, while Kirzner assumes that entrepreneurial alertness will automatically be converted into action i.e. markets are assumed to be developed (institutionalised). If they are not developed, they will be created automatically by the entrepreneurs themselves. For Schumpeter, market order is given, while for Kirzner, market order is reduced to the issue of obstacles to entrepreneurship. Thus, a neglect of the institutional dimensions of the market economy for understanding entrepreneurship can be seen as some kind of Schumpeterian legacy.

The second explanatory factor is the contemporary person centric definition of entrepreneurship which cannot be easily accommodated within the institutionally rooted perspective on NIS. As Schmid (2004: 8) points out, individuals make decisions, but those decisions are part of a system of decisions which constitute the environment of any institution. NIS reinforces individual behaviour, and individuals can create new institutions, but only if a critical mass is reached (Schmid, 2004: 9). In dissonance with this view, entrepreneurship research has been focused traditionally on individuals who are breaking routines, while NIS research has focused on institutions and how they reinforce individual behaviour. These different focuses make it difficult to integrate these two perspectives although analytically they should be complementary. In this respect, the traditional view of entrepreneurship may be considered as *de facto* anti-Schumpeterian, as Schumpeter had a functional view of entrepreneurship. While he often ascribed entrepreneurship to new firms he equally often pointed out that the entrepreneurship was primarily a function and as such could be performed by various agents (Oakley, 1990; Shane, 2003). Although adopting the functional view of entrepreneurship in specific analyses, Schumpeter 'got stuck with the new firm formation' (Shane, 2003, p.8), which was necessary in order to highlight the disequilibrating nature of the entrepreneurial process that would have been lost if he had also considered the entrepreneurial role of large firms. In his later work, *Capitalism, Socialism and Democracy* (Schumpeter, 1942) he made an

argument for the entrepreneurial role of large firms based on routinisation of innovation.

In the literature on industrial organisation this dichotomy became known as Schumpeter Mark I (entrepreneurship) and Schumpeter Mark II (management). Contemporary research on entrepreneurship has taken from Schumpeter his understanding of the entrepreneur as a heroic, almost Nietzschean, isolate individual who faces resistance to innovation, and who is driven by non-utilitarian motives. As several accounts of Schumpeter's work point out (Anderson, 1994; Oakley, 1990, Brouwer, 1991) this view of entrepreneurship resonates with the first edition of Schumpeter's (1911) *Theory of Economic Development* which was much watered down in the second (English) edition.

The question 'Who is an entrepreneur' (Gartner, 1988) remains unresolved. The decisive factor seems to be whether entrepreneurial insight is an individual act or whether it can be a collective property. For example, Casson (1982: 23) defines 'an entrepreneur (as) someone who specializes in taking judgmental decisions about the coordination of scarce resources'. He goes on to point out that this 'someone' is a person, 'not a team, committee, or an organization. Only individuals can take decisions; corporate bodies only arrive at decisions by aggregating votes'. In similar vein, and based on the view that the discovery of an entrepreneurial opportunity requires the formulation of a new means-ends framework, Shane (2003: 45) argues that 'as a result, the process of opportunity discovery is cognitive and cannot be a collective act .... Therefore, individuals, not groups or firms, discover entrepreneurial opportunities'.

This argument could be rejected on two grounds: cognitive and organisational. From the cognitive point of view, the Vygotskian argument would be that social interaction profoundly influences cognitive development (Vygotsky, 1978). Any learning or insight is result of interaction with people in the environment and cooperation with peers. All fundamental cognitive activities take shape within a matrix of social interactions. From the organisational perspective, establishing an organisation is almost never an individual act as 'organisations emerge from the interaction of agents (individuals, partners, groups, parent organisations, etc.) and the environment' (Vygotsky, 1978: 430; Katz and Gartner, 1988).

It is also plausible to argue that this is largely an empirical point and something that should not be resolved *a priori*. Individual insights are often entirely personally generated, but can be influenced by project teams, by family, friends or unknown passers-by. Hence, any conceptualisation should allow for both views, which will depend very much on the research question.

In nutshell, the question of who is an entrepreneur remains unresolved as the problem is reduced to its institutional dimension. The institutional perspective seems to dominate, and since entrepreneurship is seen primarily as an individual act it has been quite difficult to reconnect the issue of entrepreneurship with the NIS concept.

A third factor that might explain the absence of a link between NIS and entrepreneurship is the empirical difficulty in connecting entrepreneurship (firm level phenomenon) and country level analysis. Apart from GEM there are very few works

that link entrepreneurship with growth. The most comprehensive review of this literature by Carree and Thurik (2002: 2) argues that ‘this relative void may be attributable to a paucity of theoretical frameworks linking entrepreneurship to growth as well as severe constraints in measuring entrepreneurship in a cross-national context. Furthermore, there is the reversed causality of economic development influencing entrepreneurial activities’. We would add that empirical research is often forced to use rather heroic proxies in order to ‘empirically’ prove the hypothesis.<sup>3</sup>

Audretsch and Thurik (2001) is a rare attempt to econometrically test the relationship between entrepreneurship and growth. For the period 1990-94, they found ‘evidence that those countries that have experienced an increased role of entrepreneurial activity have also experienced higher rates of subsequent growth, at least for a sample of Western European countries’ (Audretsch and Thurik, 2001: 23). For a sample of OECD countries, they found that the relationship at the micro level was positive, was ambiguous at regional level, and positive at the national level.<sup>4</sup> Acs et al., (2005) show that there is positive relationship between growth and start ups, which operate as conduit for knowledge spillovers. On the other hand, GEM data show that this relationship is very much context dependent or, at least, that it changes with income levels. GEM (2004) showed that there is U-shaped relationship between level of GDP per capita and rate of entrepreneurial activity and that

the Total Entrepreneurial Activity (TEA) index declines as countries with higher per capita GDP are considered up to a critical threshold level of GDP, beyond which the TEA rate starts to increase steadily again. Specifically, for the group of countries participating in GEM 2004, the TEA rate is lowest for countries with per capita GDP of about US \$28,000. (GEM, 2004: 14)

In addition, as the general rank order of GEM countries does not vary significantly from year to year this suggests that the level of aggregate entrepreneurial activity may be a structural characteristic of a country (GEM, 2004). While these new insights help our understanding of incomes and entrepreneurship activity they are not revealing of chains of causality and how individual levels could be linked to aggregate levels. It is by necessity that they have to treat entrepreneurship as a ‘factor’ i.e. using proxies for self-employment and new firm formation, rather than as a ‘property’ of individual countries or their NIS.<sup>5</sup>

We recognise that although the NIS operates at national level it is not a macro concept. Equally, entrepreneurship is multi-dimensional and from the NIS perspective a multi-level phenomenon that cannot be reduced to a factor. As Kirzner (1980: 10) points out entrepreneurship cannot be usefully treated simply as a resource, similar in principle to the other resources available to an economic system. And:

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<sup>3</sup> See, for example, Acs and Varga (2004) which equates the rate of per capita GDP growth with the rate of technical change, which is then proxied by patents.

<sup>4</sup> Their proxies for entrepreneurship are relative share of economic activity accounted for by small firms, and self-employment rate. Proxies for performance are economic growth and reduction in unemployment.

<sup>5</sup> Aggregate and firm levels could possibly be linked through evolutionary type simulation-based micro-macro models. For an example of this type of research see Eliasson (1991).



If entrepreneurial alertness was stock then the issue would be how different economic systems use that given stock. Instead we recognise the quality of entrepreneurial alertness as something which somehow emerges into view at the precise moment when decisions have to be made (...) this opens up the important possibility that the institutional framework within which decisions are made may itself vitally affect the alertness out of which those decisions emerge. (Kirzner, 1980:12)

Here, Kirzner implicitly points out that it is more appropriate to consider entrepreneurship as a property of NIS, which emerges across different systems at different degrees of strength. As an unobservable construct any aggregate level empirical research faces the difficulty of how to capture or proxy this property. As pointed out by Kilby (2003) we can only infer entrepreneurial services from their consequences; we cannot quantify them directly. Proxies such as new firm formation, firm survival, self employment, growth, profit or income, international public offerings, are outcomes and properties of NIS rather than its causes. Thus, results are indeterminate, inconclusive, or context dependent.

In summary, the Schumpeterian legacy in terms of abstractions of the institutional environment of entrepreneurship, the person centric view of entrepreneurship which ignores interdependence between institutions and individuals, and the methodological difficulties related to treating entrepreneurship at macro-level, have made it difficult to integrate the entrepreneurship and NIS perspectives. Therefore, it is necessary to find a common basis for integration of these two unobservable constructs.

### **3. FUNCTIONAL VERSUS INSTITUTIONAL VIEWS OF NIS AND ENTREPRENEURSHIP**

In this section, we argue that the common conceptual basis for linking NIS and entrepreneurship is the functional view of these phenomena.

#### *3.1. Institutional vs functional views of NIS*

We start with a critique of the dominant institutional views on NIS. We depart from Freeman's (1987:7) view that a NIS is 'the network of institutions in the public and private sectors whose activities and interactions initiate, import and diffuse new technologies'.<sup>6</sup> This, and other definitions of national, but also sectoral and technological systems of innovation, define system in institutional terms, i.e. as a network of agents, a population of firms, a set of institutional actors, the system of interacting public and private firms, universities and government agencies, etc. (see Radosevic, 1998, for an overview and critique).

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<sup>6</sup> Freeman (1987) and Lundvall (1992: 2) distinguish between the *narrow* NIS (organisations and institutions involved in searching and exploring - such as R&D departments, technological institutes and universities) and the *broad* NIS (all parts and aspects of the economic structure and the institutional set-up affecting learning as well as searching and exploring - the production system, the marketing system and the system of finance. (For examples of narrow and broad NSI see Freeman, 2002: 194-195.) For our purposes, we distinguish here between 'narrow' NIS as composed primarily of organisations directly involved in innovation processes, and 'broad' NIS consisting of institutions, norms and rules (formal and informal) which (directly or indirectly) affect the innovation process.

The methodological problem of defining NIS only in institutional terms is that there is no simple relationship between the institutional forms of national systems and economic functions. Economists who focus on national systems of political economy as a framework within which NIS play an important role, encounter similar problems. As Gilpin (2001: 178) points out:

Different societies use different institutional arrangements to perform the same economic functions ... there is not one to one correspondence across national economies between structure and function. Economic and technological objectives can be fulfilled by differing economic institutions and practices.

This is essentially the view held by Rodrik (2003: 3) when he argues that ‘the first order economic principles – protection of property rights, contract enforcement, market based competition, appropriate incentives, sound money, debt sustainability – are institutionally free’ i.e. these principles can be implemented within different institutional forms. There is no unique correspondence between the functions performed by good institutions and the form that such institutions take. Different societies use different institutional arrangements to perform the same economic functions (Gilpin, 2001, p. 178, citing Berger and Dore, 1996)<sup>7</sup>. Or, economic and technological objectives can be fulfilled by differing economic institutions and practices (Gilpin, 2001). However, this does not mean that institutional systems are entirely ‘plastic’. Structural factors, such as market, technology and finance gaps, generate boundaries within which national systems can vary.<sup>8</sup>

A similar set of arguments was proposed by Radosevic (1998) in his critique of the notion of system of innovation. Radosevic (1998) concludes that systems of innovation should be defined not only in institutional terms, but also in technological terms or, more generally, in functional terms.<sup>9</sup> Otherwise, there is a danger that definitions will become circular, i.e. any institutional variety could be declared relevant from an economic or technological perspective, which would be misleading

The issue then becomes one of identifying which institutions are relevant for explaining systems of innovation or what is the relevant diversity between two systems. In the absence of criteria for defining relevant institutional diversity it is tempting to include additional factors or institutions to explain differences between the two systems. We can conclude therefore (Radosevic, 1998) that:

- i) System of innovation should not be defined in institutional terms only but also in technological terms or, more specifically, in terms of technological regime (Breschi et al., 2000)<sup>10</sup>.

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<sup>7</sup> This Gerschenkronian point (see below section 3.2) was outlined in Galli and Teubal (1997).

<sup>8</sup> Gilpin (2001: 178) contended that economic performance is ultimately a function of many factors and cannot be completely explained by any one institutional arrangement. However, we would argue that this does not mean that the way institutional forms vary is unrelated to structural factors.

<sup>9</sup> Boundaries of institutional diversity of systems of innovation are provided by technological regimes. The relevant institutional differences between systems of innovation occur those where interaction between institutional set-ups and technological regimes produces a distinctively different techno-institutional configuration.

<sup>10</sup> The concept of technological regime is defined in terms of the level and type of opportunity and appropriability conditions, by the cumulativeness of technological knowledge, by the nature of

- ii) Technological regime is a structuring force that provides boundaries of institutional diversity. Only those institutional differences that influence and shape technological regime are relevant from a systems of innovation perspective.
- iii) Different systems of innovation occur where the interaction between institutional set ups and technological regimes produces a distinctively different techno - institutional configuration. Varieties of institutional setup that do not produce effects on technological regime are irrelevant from an economic perspective.

To summarise, we would argue that only institutional variety that performs different economic function (functional variety) can be considered relevant from an economic perspective. Or, in terms of technology, only variety that performs different technological function (technological variety or variety in terms of technological regime) can be considered relevant from an economic-institutional perspective.

It should not be concluded from the above discussion that functions or activities have been neglected within the systems of innovation literature. An exploration of which functions are served in different innovation systems shows that there is 'quite widespread correspondence between different systems approaches with respect to the function they mention so that a number of common, basic functions can be identified' (Johnson, 2001: 1). According to Hekkert et al. (2004) the most basic function that is mentioned in many systems of innovation studies is the activity 'learning' or 'interactive learning'. Johnson (2001) points to a variety of similar functions directly and indirectly (supporting functions) related to the innovation process.

Why is it useful to focus on functions in innovation systems? Johnson (2001) sees several benefits. First, the concept of function provides a tool for setting system borders.

The innovation system would then include all components that influence one or more of the identified functions for the object of study (e.g. a product or technology). This means that borders are not set a priori to nation, region or technology and that different levels of analysis may be combined. (Johnson, 2001: 16)

Second, the concept of function can be used as a tool to describe the present state of a system. Third, by mapping functional patterns, i.e. how functions have been served we can study system dynamics. Fourth, it allows us to assess the performance of innovation systems by analysing its 'functionality' i.e. how well the functions have been served. Fifth, by focusing on functions 'actors may be uncoupled from what happens in an innovation system. This may be useful in comparative studies since it reduces the risk of comparing system structure instead of systems functionality; two systems may function equally well even though their structure is totally different' (Johnson, 2001: 17).

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knowledge, and by the means of knowledge transmission and communication. This is basically a technological trajectory, defined multi-dimensionally. See Breschi et al. (2000).

However, an overly functionalist view of innovation systems is not without its problems.<sup>11</sup> We think the approach has advantages, as shown by an earlier critique of innovation systems as defined only in institutional terms (Radosevic, 1998). However, there is the danger that the baby is thrown out with the bath water, or in other words that functions become largely the outcome of institutional systems. Similar to technological regime, opportunities, appropriabilities, cumulateness, and knowledge base do not automatically appear, but are themselves the product of institutional development (Radosevic, 1998). Although one could argue that these institutions are ‘hard’ facts, this does not solve the problem of institutional differences based on the same technological regime. Actors and functions have to be linked if we are to avoid the other extreme of irrelevant functional variety from an institutional point of view. In uncoupling institutions and functions we lose the rationale for a systems of innovation approach. If ‘system functionality’ (Johnson, 2001) is not coupled to ‘system structure’ (network of actors) what is the point of a, innovation system approach? Hekkert et al. (2004), for example, proposed a model to structure empirical work on functions in innovation systems which loses sight of institutions. This approach was described by Balzat and Hanusch (2004) as ‘performance oriented’, which by necessity leaves out the institutional framework.

Therefore, if we are to integrate one of the key functions – entrepreneurship - into the NIS approach, we must not lose sight of how functions relate to actors and institutions i.e. we must not end up in an institutionally-free world of functions. The functional view of systems of innovation was developed most in the work of a Swedish team led by Jacobsson (see Bergek et al., 2005). (For application of this approach in the case of new energy technologies see Jacobsson and Bergek, 2001, 2003, 2004; Jacobsson et al., 2004.)

Jacobsson et al., (2004), and Bergek et al. (2005) describe the system structure in terms of actors, networks and institutions. However, what is most relevant for us is their classification of functions in sectoral system of innovation. They elaborate seven functions which enable them to assess: a) achieved functional pattern; b) functionality and setting process goals; and c) targeted functional pattern. According to Bergek et al. (2005), the seven key functions in sectoral system of innovation are:<sup>12</sup>

- Knowledge development
- Influence on the direction of search
- *Entrepreneurial experimentation*
- Market formation
- Legitimation
- Resource mobilization
- Development of external economies

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<sup>11</sup> A functionalist view of innovation systems should not be equated with functionalism in sociology.

<sup>12</sup> From our perspective, it is interesting to note that only two of their functions are ‘technological’ (knowledge development and influence on direction of search). Our only objection relates to ‘development of external economies’ as a function. External economies are basically institutional interdependencies and hence this notion hides more than it reveals about this function in systems of innovation. Finally, this approach has been developed to the point that the authors have produced a manual to use as a guide for empirical work on sectoral systems of innovation.

Bergek et al. (2005: 33) use the label ‘entrepreneurial experimentation’ in order to emphasise ‘that it is the creation of new combinations and variety that is in focus and that many different types of actors – not only new ones – may contribute to this function’. It is expected that this function will be more important for systems of innovation in their formative stage (Bergek et al, 2005) rather than for mature systems. As proxies for this function they use number of entrepreneurial experiments, i.e. number of new entrants and diversifying established firms, and variety in entrepreneurial experiments, i.e. number of different types of applications, the breadth of technologies used and the character of the complementary technologies employed. Data on these activities are collected through interviews, trade fairs, trade journals, catalogues, etc.

From a systems of innovation perspective, the most relevant aspect is the interaction between entrepreneurship and other functions. Bergek et al. (2005) provide several examples of these interactions. For example, improved legitimacy may positively influence ‘entrepreneurial experimentation’. Uncertainty regarding applications, markets, business models and customer utility reduces incentives for ‘entrepreneurial experimentation’. A poor articulation of demand blocks ‘entrepreneurial experimentation’. Low level of ‘entrepreneurial experimentation’ negatively influences ‘resource mobilisation’ and ‘knowledge development and diffusion’. Provision of seed capital may encourage ‘entrepreneurial experimentation’. On the other hand, weak ‘entrepreneurial experimentation’ within immature technology fields, may result in lack of variety.

So far, we have ignored problems in the application of the functional perspective on NIS. A focus on NIS may not produce conceptual problems in the adaption of this or similar functional taxonomy to the national level. On the other hand, more practical problems related to data collection and technical ability to engage in in-depth interviewing given the scale of the research, may call for modifications to this approach. An alternative could be to treat the national level as a mix of sectors of different degrees of maturity, and to search for functional similarities across sectors that could be seen as national.

### *3.2. Institutional versus functional views on entrepreneurship*

Problems of institutional vs functional views also arise in research on entrepreneurship. As Metcalfe (2004) put it, ‘the entrepreneur comes in shades of many different kinds’ i.e. as individuals, family, enterprises, networks, etc. The problem of distinguishing forms from functions of entrepreneurship are widely accepted in the literature as discussions such as ‘who is the entrepreneur’ indicate (Shane and Venkataraman, 2000). Below, we briefly highlight the key concerns in this aspect of entrepreneurship.

Casson (1982) pointed out that the most difficult part of studying entrepreneurship is defining who or what is an entrepreneur? He distinguishes between *functional approaches* in which: ‘an entrepreneur is what an entrepreneur does’ (it specifies a certain function and deems anybody who performs this function to be an entrepreneur, (Casson, 1982: 22) and *indicative approaches* in which an entrepreneur is defined in terms of his legal status, his contractual status, position in society, etc.

The functional definition of entrepreneurship describes a task that is, in principle, performed in all societies by ‘men whose judgements differ from the norm’ (Casson, 1982: 347-348). On the other hand, we know that entrepreneurship can take many different forms depending upon the economic system in which the entrepreneur is operating. Casson (1982: 348) points out that ‘each system affords some scope for entrepreneurship though some systems afford much more scope than others. This means that in a representative society the entrepreneur has a choice of institutions within which to exercise his function’. So, the diversity of institutional forms within which entrepreneurship can be exercised is large. Moreover, we can assume that the institutional forms of entrepreneurship are even more diverse in more developed economies, and that also institutional forms may be significantly different in latecomer economies. These three propositions seem to have been accepted. Below, we review some of the studies that have elaborated them.

Historical experience suggests that there is diversity of forms of industrial organisation of entrepreneurial functions. Gerschenkron (1966: 7) argued that

in a number of important historical instances industrialization processes, when launched in backward country, showed considerable differences, as compared with more advanced countries, not only with regard to the speed of the development (the rate of industrial growth) but also with regard to the productive and organizational structures of industry which emerged from those processes.

These different institutional solutions to catching up emerged not only in finance, but also in entrepreneurship. They emerged as a local response to differential initial conditions. Thus, Gerschenkron (1969) and also Hirschman (1958) reject the notion of prerequisites for economic development, i.e. one uniform set of institutional preconditions for modernisation. For example, Hirschman (1958: 9) argued that ‘just as there is not a given set of “prerequisites” for economic development, so it is impossible to define a fixed number of backwardness features. What is hindrance to progress in one setting and at one stage may be helpful under different circumstances’. As result of this local response we see new institutions ‘operating as substitutions for missing prerequisites’. Capital supply is one example of a substitution for missing prerequisites (Gerschenkron, 1966: 358) and substitutions can also occur in lieu of entrepreneurs. An example of engineers as functional alternative to entrepreneurs in Japanese industrialization can be found in Yasamuro (1993). Nearly 20 years earlier, Leff (1978) pointed out that business groups in developing economies helped to relax entrepreneurial constraints which might have been expected to limit the pace of their economic development. This institution allowed ‘pure’ Schumpeterian entrepreneurship to become effective by providing the capital, and the technical and managerial resources, necessary to transform ‘innovativeness and alertness to opportunities (p.699)’ into actual investment and production decisions (Leff, 1978). As Leff (1978: 670) pointed out ‘the group structure itself reduces the amount of entrepreneurial capacity which is required per unit of innovative decision making. Thus the groups’ participation in many different activities increases information flows and reduces uncertainty surrounding investment and production decisions’. The group overcomes deficiencies in product and factor markets. By connecting different markets, the entrepreneur can compensate for market deficiencies

(gap filling) or bring in missing inputs (input-completing capacities) (Leibenstein, 1968).<sup>13</sup>

Although this Gerschenkron–Hirschman proposition seems to be logical, and has been accepted in some fields, it is not given credence in the entrepreneurship and policy literature. As argued earlier, entrepreneurship research does not take into account the variety of institutional forms that generate entrepreneurial activity, including its systemic determinants. Its focus on new firms and self-employment lose sight of entrepreneurship as a generic human activity (Spinosa et al., 1997) and view entrepreneurship as a sectoral activity. In policy terms, the Gerschenkron–Hirschman proposition has been large ignored, as witnessed by the policy experience in ex-socialist (transition) economies which philosophically and conceptually did not allow for ‘substitution of missing mechanisms’. The idea underlying ‘transition programme’ is the existence of one best practice and the measurement of progress towards achievement of that best practice (see EBRD, Transition Reports from the 1990s).

Another problem with entrepreneurship is that it always appears mixed up with other kind of activity (Schumpeter, 1934: 77). This is essential for von Mises (1949: 253-54) for whom entrepreneurship is a function that is inherent in every human action. This further complicates the relationship between the functional and institutional dimensions of entrepreneurship as it opens up the issue of what is considered to be an entrepreneurial function.

For Schumpeter, in contrast to Kirzner, a new business is not necessarily entrepreneurship. Metcalfe (2004) also thinks that it stretches the notion of entrepreneur too far. For him, ‘Many business ventures are copies of existing businesses whose function is to ensure the continuity of economic activities through time, they are based on knowledge of well established markets and practices, and in that sense bring nothing new to the economy’ (Metcalfe, 2004: 34). This is not only a philosophical and conceptual but also a definitional and statistical problem, in which case, business demographics data, which measure entrepreneurship very broadly, should be taken as proxies for Kirznerian but not for Schumpeterian entrepreneurship. If we confine ourselves to the Schumpeter-Metcalfe definition, the subset of entrepreneurial firms would be confined to new technology based firms. So, problems of entrepreneurial function and form are not trivial. They are probably not entirely solvable and their resolution will always be context specific i.e. having in mind the objective of inquiry. A more realistic objective would be to minimise the differences between the conceptual and operational definitions of entrepreneurship. Sometimes these differences are large, which leads to inconsistency. For example, Shane (2003: 4) avoids the problem of defining of who is an entrepreneur by defining entrepreneurship as ‘an activity that involves the discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organizing, markets, processes, and raw materials through organizing efforts that previously had not existed’. However, his operational definition of entrepreneurship identifies it as: new firm formation (founding a new business) and as self employment.

We are not in a position to offer a general solution to this problem. As pointed out earlier, the solution will always be context specific. From our perspective, a general

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<sup>13</sup> For an essentially similar argument, but in contemporary context, see Rodrik (2004).

solution would be, first, to identify which activities are to be recognised as entrepreneurial, and, second, who are the entrepreneurial actors or what are the institutional substitutes of entrepreneurship compared to the ‘norm’.

### *3.3. Towards the functional view of NIS and entrepreneurship*

Both, NIS and entrepreneurship are ill defined concepts, reflected by the difficulty involved in delineating their functional and institutional attributes. In the case of NIS, this creates uncertainty in determining systems boundaries and in defining the relevant institutional variety. Entrepreneurship emerges in institutionally diverse forms, and inter-country research needs to recognise this diversity. Hence, the entrepreneurship problem is similar to the NIS problem in that there is not direct correspondence between the organisations (actors) and the functions they perform. The problem is how to link up two ill-defined concepts, which suffer from functional/institutional non-equivalence. We think that a common denominator for both approaches should be sought in functions. A functional view of NIS and entrepreneurship basically means the following:

- Entrepreneurial experimentation is one of the key functions of system of innovation (cf. Bergek et al., 2005)
- Who is performing the entrepreneurial function is a ‘secondary’ issue compared to the primary issue of identifying what entrepreneurship activity takes place.
- The systems of innovation approach to entrepreneurship should aim to describe how entrepreneurial experimentation contributes to the overall functioning of innovation systems, be they sectoral, regional or national
- Functioning of entrepreneurship cannot be understood outside the overall functional set up of system of innovation, i.e. the links with other functions, and identification of the key actors that support these other functions

## **4. WHAT IS THE ENTREPRENEURIAL NIS?**

We assume that there are important differences between different economic systems with respect to their success in harnessing entrepreneurship. In what follows we depart from the functional views of NIS and entrepreneurship and develop some criteria for what constitutes an entrepreneurial NIS with the aim of enabling more rigorous analysis of the entrepreneurial propensity of different NIS.

### **4.1. ‘Individual’ vs ‘cooperative’ components of entrepreneurship**

A distinction between individual and cooperative entrepreneurship is relevant for NIS. We have pointed out that based on early Schumpeter the innovating entrepreneurs are primarily perceived as strong individualists. However, Hirschman (1958) emphasised the shortage in the cooperative component of entrepreneurship. Hirschman (1958: 16, 17) notes that



following Schumpeter's lead, economists and historians alike have hitherto considered the innovating entrepreneurs primarily as a strong individualist ... – so much that the other necessary component was practically overlooked. This other component involves the ability to engineer agreement among all interested parties, such as the inventor of the process, the partners, the capitalists, the suppliers of parts and services, the distributors, etc - to enlist cooperation of official agents in such matters as custom, duties, permits exchange control regulations, etc.; the ability to bring and hold together an able staff, to delegate authority, to inspire loyalty, to handle successfully relations with labour and the public and host of other managerial talents.

Moreover, Hirschman (1958: 19) asked 'whether the cooperative component has actually been overdeveloped in the US' (cf. during the 1950s) and notes 'the shortage of the cooperative component of entrepreneurship in many underdeveloped countries'.

This view of entrepreneurship is at odds with Casson's (1982: 66), who argues that 'in order to protect his superior judgment he (cf. entrepreneur) has to keep apart the people between whom he is intermediating. He also has to ensure that he does not weaken his bargaining position by giving away too much information in the course of negotiating with each party'. Casson emphasises what Hirschman terms the ego view of change and does not see a role for cooperative entrepreneurship. Although Casson (1982: 109) notes that the 'information on which judgment is based is [a] public good in common ownership' he does not see a role for information sharing and cooperative behaviour as his 'successful entrepreneur is always vulnerable to threat[s] of imitation'. Hence, 'the erection of barriers to entry is important in consolidating the entrepreneurs' temporary lead over competitors'.

In this context it is instructive to refer to Frank H. Knight (1921) for whom entrepreneurship is primarily a reward for uncertainty. From Knight's perspective, the distinction (individual or cooperative entrepreneurship), and the issue of whether the essence of entrepreneurship is 'insight' or 'skill' (see below section 4.2.) are irrelevant. Namely, as Knight (1921: 287, 288) points out 'estimates of the worth of other men's opinions and capabilities probably form by far the largest part of the data on which any individual makes decisions in his own life, at least in the sphere of economic activity where such activity is highly organized'. And 'The importance of indirect knowledge of fact through knowledge of others' knowledge' makes a very blurred distinction between what constitutes entrepreneurship (individual or firm) and what is its essence (insight or skill).

Knight (1921: 289) explains this by saying that

when men have knowledge or opinions on which they are willing to act, of other men's capacities for the entrepreneurial function, all this is changed; entrepreneurship is not longer as simple and sharply isolated function. This is, of course, the state of affairs in real life, and it is this partially specialized and more or less *distributed entrepreneurship* which merits most careful consideration. (emphasis added)

The distinction between individual and cooperative entrepreneurship breaks down completely in Penrose's (1959: 41) interpretation of entrepreneurship that the problem of individual judgement goes beyond personal qualities and is closely related to

the organization of the information gathering and consulting facilities within a firm .... Because the 'expectation' of a firm – the way in which it interprets its 'environment' – are as much a function of the internal resources and operations of a firm as of the personal qualities of the entrepreneur.

From a NIS perspective, the interdependent nature of institutions (see Section 5.3) is essential to the cooperative component of entrepreneurship (Hirschman) or to distributed entrepreneurship (Knight). Moreover, Hirschman (1958: 19) recognised that:

the 'human relations' component of entrepreneurship, the art of agreement reaching and cooperative enlisting, will remain a critical bottleneck to constructive action for economic development until experience modifies the exclusively ego focused image of change into one which takes cognizance of the possibility of mutual benefits and all round growth.

On the other hand, Hirschman (1958: 17) also recognises that 'the 'creative' component of entrepreneurship and management could be smothered by too much cooperation, conformism, other directedness' smoothness in human relationships, and consequent insufficient 'willingness to disagree' . This may suggest that in different techno-economic periods there is a need for different components of entrepreneurship which would follow logically from the theory of long-term structural change proposed by Perez (2003). According to her, we are in the midst of a shift in period from 'installation' to 'deployment' in the techno-economic paradigm.<sup>14</sup> If Perez (2003) is right, then when academia recognises the importance of entrepreneurship its policy relevance will be reduced as one would expect in 'deployment' stage of techno-economic paradigm.

#### **4.2. Entrepreneurship as an act of 'insight' vs an act of 'skill'**

From the NIS perspective, it is important to understand what constitutes entrepreneurship as this has implications for how NIS affects it. For Austrian economists entrepreneurial alertness constitutes the core of the entrepreneurship act. On the other hand, Casson (1982) argues that there cannot be growth without skills, i.e. entrepreneurship also involves skills. For Kirzner (1973) the introduction of the concept of alertness signals the end, rather than the beginning of explanations of the market process. For Schumpeter (1934) it is neither alertness nor skills, but psychology (the dream and will to found a private kingdom; the will to conquer; the job of creating, of getting things done). However, Schumpeter also points out that the purely entrepreneurial act occupies only a small proportion of the entrepreneur's time. In the remaining time the entrepreneur manages the growth of his/her business

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<sup>14</sup> In Audretsch and Turik's (2001) terminology this would correspond to a shift from the 'entrepreneurial' back towards the 'managed' economy.

by building up its organisation. In this stage, skills are needed to delegate, to manage, to provide incentives, to integrate (Casson, 1982).

This is not to deny that Kirzner (1973: 67) also does not see a need for knowledge or skills. However, the aspect of knowledge that for him is crucial for entrepreneurship 'is not so much the substantive knowledge of market data as alertness, the 'knowledge' of where to find market data'.

In what respect has alertness changed in the knowledge based economy? And what are its implications for NIS?

The accumulation of knowledge about 'where to find market data' (Kirzner) has become increasingly IT based. In particular, codification, or the conversion of complex knowledge into user friendly information, has become economically very important in all sectors. We believe that this has affected the nature of entrepreneurship in ways that Kirzner and the Austrian economists did not foresee. With the increasing technical opportunities to codify knowledge, the expert knowledge on which entrepreneurs increasingly rely in the modern economy, has become *externalised and translated into symbolic representation* so that it can be stored on a particular medium (OECD, 2004). Externalisation of knowledge and its storage in various new knowledge objects (databases, classifications, taxonomies, tree networks, tables) create new cognitive potentials. These objects enable further memorisation, communication and learning, and form a sound basis for the creation of new knowledge objects (OECD, 2004).

What are the implications of this for entrepreneurship, and especially knowledge based entrepreneurship? How to manage knowledge is one of the competencies required in the knowledge economy. These competencies include such skills as sharing, sorting and memorising, communicating, codifying, retrieving documents etc. (OECD 2004b). Knowledge based entrepreneurship has become increasingly reliant on the variety of these competencies and hence Kirznerian knowledge of where to find market data becomes increasingly inadequate to describe the nature of the entrepreneurial skills in information intensive environments. This does not mean that the role of human insight has decreased. We would argue that in an increasingly knowledge and information intensive environment it has become more important, but its exercise has become increasingly dependent on old 'soft' skills such as teamwork, communication and learning, as well as on IT networking and reliance on a variety of expert systems and knowledge bases. Thus, individual entrepreneurship, in which insight plays crucial role, has become ever more dependent on a variety of collective phenomena. In this respect, Kirzner's views appear both obsolete and quite relevant.

What are the implications of this shift for NIS? A new issue for NIS is not only how to incentivise individual entrepreneurs, but also how to provide new IT infrastructure and to 'embody' entrepreneurs within the social networks where knowledge is shared. OECD (2004) defines this as the challenge of establishing a new kind of organisation: a knowledge intensive community. These 'interdisciplinary communities made up of a heterogeneous range of members' (OECD, 2004: 36) are essential social infrastructures enabling individual entrepreneurs to generate insights (Kirzner) and understand information and knowledge intensive issues.

### 4.3. Impact of entrepreneurial uncertainty on industry organisation and NIS

Knight's (1921) risk bearing theory defines entrepreneurship as the reward for bearing the costs of uncertainty.<sup>15</sup> For Knight, uncertainty is reduced mainly through consolidation of uncertainties by large firms. The gains from uncertainty reduction by large scale organisation, are so high that the most important uncertainties relate not to producing for the market itself, but to the selection of managers able to take production decisions. So, the firm is perceived as a solution to uncertainty while entrepreneurship is exercised through the firm (Ricket, 2002). In the world of uncertainty, contracts are loosely specified and operate within the context of some governance structure, i.e. firm, consortium, network (Ricket, 2002). This understanding of the firm is in line with evolutionary views.

Thus, Knight introduces into the discussion the forms of organization and modes of distribution of entrepreneurship. From the NIS perspective, the issue of firm organisation is essential for understanding who are the key actors in the innovation process. From a Knightian perspective, NIS that are better at codifying the signals relating to capabilities and risks, seem to be more conducive to entrepreneurship. Forms of industrial organisation that are better at codification and standardization are also more conducive to entrepreneurship as they reduce the importance of indirect knowledge, i.e. knowledge of others.

Which form of industry organisation is currently more conducive to the distribution of risk and uncertainty? Saxenian (1991) argues that it is the loosely integrated network form of organization. Sturgeon (2002) argues that risk is better distributed through a network ('American business model') rather than through a large M or U form firm. A mode of production based on diffusion of contract manufacturing is better suited to dispersion of risk. As Sturgeon (2002: 476) points out 'although the frequency and (market) uncertainty of the transactions have been high, lead firms have little incentive to build internal manufacturing capacity' which has been made possible due to the modular production network which 'divorces the size of the firm developing new product from manufacturing scale economies'. The adoption or reaction of different NIS to this new mode of production organisation is extremely relevant for understanding their nature in the globalised economy. Brusoni and Prencipe (2001) show that product modularisation calls for a highly interactive organisational set up and that the knowledge boundary of the firm in a modularised world is fundamentally different from the boundaries defined by make or buy decisions. A knowledge and product dynamics of modularised production follow different paths, which highlights the role of 'system integrators'.

Here, Knight's insights on uncertainty contribute to our understanding of market structures as a 'medium' for the promotion of technical change. The literature has been dominated by discussions about whether it is large or small firms that are more likely to be innovative (Kamien and Schwartz, 1982). Audretsch and Thurik (2001b) argue that many old and large firms have lost ground to their small, new and more entrepreneurial counterparts. They refer to this as a regime switch (reversal of the

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<sup>15</sup> For Knight, uncertainty, unlike risk, is a situation where the probabilities of alternative outcomes cannot be determined by either a priori reasoning or statistical inference.

trend) from Schumpeter Mark II to Schumpeter Mark I, or from a ‘managed’ to an ‘entrepreneurial’ economy.

However, this proposition of a shift backward seems quite unlikely and counterintuitive. For example, when a new techno-economic paradigm emerges (Perez, 2002) it induces the growth of small firms, but because of increased uncertainties, as pointed to by Knight, it also encourages the emergence of large firms, which consolidate the uncertainty. Freeman and Perez (1988) argue that in the new techno-economic paradigm the organisation of firms will be ‘networks’ of large and small firms. If so, a shift towards Schumpeter Mark III or networks will be likely. Numerous researchers have shown that the locus of innovation in high tech industries has shifted from individual firms to networks of firms that collaborate formally or informally. These networks include venture capitalists, universities and research centres, other organisations within the industry, and firms from other industries. Whether there is shift towards Schumpeter Mark I or Mark III is of huge relevance for the transformation of NIS. The issues of ‘systemness’ will vary hugely depending which of these two modes of industrial organisation are shaping NIS.

In summary, we have argued: first, that NIS are affected by the balance between individual and cooperative entrepreneurship; second, that the act of entrepreneurship involves both ‘insight’ and ‘skill’, but the relationship between the two is changing and the collective features of knowledge based economy (KBE) or NIS are increasingly important for individual entrepreneurship; and third, that entrepreneurial uncertainty has direct effects on firm organisation and indirect effects on the organisation of NIS. Underlying the linkages between entrepreneurship and NIS are issues related to the systemic nature of entrepreneurship: cooperative dimension of entrepreneurship, knowledge infrastructure basis for entrepreneurial insights in KBE, and the shift towards network forms of industry organisation with related changes in the nature of entrepreneurship. These insights have enabled us to formulate three hypotheses about the entrepreneurial NIS.

H1: Entrepreneurial NIS can change the balance between individual and cooperative entrepreneurship, based on changing technological opportunities.

H2: Entrepreneurial NIS are able to enhance both aspects of entrepreneurship: market opportunities and alertness, as well as entrepreneurial and technical skills.

H3: Entrepreneurial NIS can resolve the trade off between generating uncertainty through deregulation, liberalisation and product market reforms, and support for business models and institutions that pool uncertainty.

## **5. SYSTEMS OF INNOVATION PERSPECTIVE ON ENTREPRENEURSHIP**

In this section we claim that from a system of innovation perspective entrepreneurship is the outcome of the simultaneous emergence of three types of opportunities – market, technological and institutional. First, we discuss the notion of entrepreneurial opportunities presented in the literature. Second, we discuss each of the three types of opportunities that form our conceptual model. Third, we discuss why the simultaneous emergence of these three types of opportunities makes entrepreneurship a systemic phenomenon.

## 5.1. What constitutes entrepreneurial opportunities?

Opportunities are at the core of entrepreneurship (Shane and Venkataraman, 2000). As pointed out by Shane (2003: 10) ‘the entrepreneurial process begins with the perception of the existence of opportunities, or situations in which resources can be recombined at a potential profit’. Wennekers and Thurik (1999: 46) define entrepreneurship as ‘the manifest ability and willingness of individuals, on their own, in teams, within and outside organizations *to perceive and create new economic opportunities*’ (emphasis added) .

What constitutes entrepreneurial opportunity is generally seen as unproblematic. The dominant perspective is that entrepreneurship is a nexus of enterprising individuals and valuable opportunities (Shane, 2003). Individual differences are seen as crucial in the discovery of entrepreneurial opportunities. Entrepreneurs discover opportunities that others do not recognise, because they have better access to information or because they are better at recognising opportunities (Shane, 2003).

The individual–opportunity nexus is taken as the basis for the entrepreneurial theory of firm developed by Dew et al., (2004) in which the emergence of the entrepreneurial firm is represented as the coming together of formerly dispersed knowledge about opportunity and resources, in a specific location at a point in time. ‘The dispersion of economic knowledge over people, places, and over time leads to genuine uncertainty. A firm is created when an entrepreneur recognizes an opportunity in an environment of genuine uncertainty and is unable to sell this opportunity in the market’ (Dew et al., 2004: 660). Within this perspective ‘the role of individuals is the primary issue that deserves explanation, since ... the origin of routines (which is presumably strongly influenced by the founder, my addition) must be explained in order for a theory of the firm based on routines to be robust’ (Dew et al., 2004: 677).<sup>16</sup>

In their entrepreneurial theory of firm, Dew et al. (2004) see firm formation as the simple realisation of an opportunity grasped by an individual. The process of firm formation and growth is perceived as unproblematic. This view of the entrepreneurial firm stands in contrast to Tsoukas (1996), which argues that a firm’s knowledge is distributed, not only in the Hayekian sense (Hayeck,1945) of dispersed knowledge on which Dew et al.’s (2004) theory is based, but also in the sense that ‘it is inherently indeterminate; nobody knows in advance what that knowledge is or need be’ (Dew et al., 2004: 22). Tsoukas argues that explicit and implicit knowledge, and individual and social knowledge are mutually defined and cannot be separated from one another. If firms, argues Tsoukas (1996), lack the cognitive equivalent of a ‘control room’ then the role of individuals is much less important than is presumed by Dew et al. (2004).

Shane (2003: 18) defines an entrepreneurial opportunity ‘as a situation in which a person can create a new means-ends framework for recombining resources that the entrepreneur *believes* will yield a profit’. For Casson (1982: 45), ‘as a result, the

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<sup>16</sup> An answer to Phan’s (2004: 617) question about ‘why and when entrepreneurial firms do not emerge even when the condition for the event appear to exist’ from Dew et al.’s (2004) perspective is that it is entirely due to differences in individuals’ perceptions of opportunities.

process of opportunity discovery is cognitive and cannot be a collective act. Therefore, individuals, not groups or firms, discover entrepreneurial opportunities. Indeed, this definition seems appropriate from the perspective of individual entrepreneurship. If we think of a new means ends framework as acts of insight that are unique only to individuals, then this may be logical. However, if we take into account that entrepreneurship is very often cooperative, that it is also an act of skill that is often dispersed, and that due to uncertainty the organisational mechanisms of its reduction are essential to its exercise, then the logic of new means-ends frameworks becomes inadequate as a conceptual framework.

This framework may be sufficient in conditions of Kirznerian disequilibria where new end-means frameworks can be operationalised as new strategies of arbitrage. However, when faced with pervasive uncertainties, institutional obstacles and the need to rely on a variety of supporting actors, it becomes rather inadequate to encapsulate opportunities. The creation of a new means–ends framework is better seen as a process whose result has been rationalized *ex post* as a, rather than as clear image of future situation. new framework

Rather than thinking about new means–ends frameworks for opportunities we prefer to think of opportunities as multi-dimensional and as ‘objective’ phenomena in the sense that these opportunities are common to all entrepreneurs. For example, the opportunities from ICT were obvious to entrepreneurs as they were inherent in the nature of the emerging technological trajectory. What we see as an outcome of successful entrepreneurship is much less a unique insight and much more an evolutionary process of the coming together and realisation of different opportunities.

Indeed, variations in entrepreneurial opportunities account for a substantial part of patterns of entrepreneurial activity. From a system of innovation perspective it could be argued that this is the major part, as capable actors will emerge mainly depending on variations in opportunities. For example, if the accumulated technological and market opportunities which enabled the rise of Microsoft had not occurred, Bill Gates capital, like that of as many others, would have been squandered. His entrepreneurial capabilities would have been secondary in a context of weak market and technological opportunities. (See the discussion and related references in Holcombe, 1999.)

What constitutes entrepreneurial opportunity? There is probably not one general answer to this, as it depends on the level (firm, industry, national) as well as on the disciplinary scope of inquiry (business, economics, sociology). For example, Shane (2000) considers three major sources of opportunities: technological change, political/regulatory change and social/demographic change. From a systems of innovation perspective we consider:

- Technological opportunities
- Market opportunities
- Institutional opportunities.

We argue that entrepreneurship is driven by complementarities arising from the favourable interaction of all three types of opportunities. In the absence of one of these, entrepreneurial opportunities cannot be realised. This perspective is actually an integration of three views on entrepreneurship: Kirznerian, Schumpeterian and

Listian. In each of these views, entrepreneurship is a function of different driving factors.

- Kirzner: entrepreneurship = imbalances/ distortions/ asymmetries/ disequilibria on the market
- Schumpeter: entrepreneurship = technological opportunities
- List: entrepreneurship = national system of political economy/institutional complementarities or synergies.

For Kirzner (1973), entrepreneurial opportunities are a function of imbalances, distortions, asymmetries and various disequilibria in the market. People use the information they possess to form new means-ends framework, that guides their entrepreneurial action. For Schumpeter (1934), entrepreneurship is a function of innovation opportunities, which are a key precondition for the generation of entrepreneurial rents, and their erosion through subsequent imitation processes.<sup>17</sup> Generation of innovation, which is enabled by the state of inventions, is essential in explaining the existence of entrepreneurial opportunities. In our interpretation of List (1909), which here serves as an antecedent to the contemporary institutional economics and systems of innovation approaches, entrepreneurship is a function of the development of a national system of political economy and related institutional complementarities or synergies, which are conducive to entrepreneurship. From the institutional economics perspective, as defined by Schmid (2004: 1), institutions define the opportunity sets of interdependent transacting partners. Accordingly, institutional opportunities for one party are inevitably constraints for another, and *vice versa*. This is in contrast to new institutional economics, including the views of Douglas North, which define institutions primarily as constraints.<sup>18</sup>

Before we explain what makes this framework systemic, we elaborate these three views of entrepreneurship and entrepreneurial opportunities. The description of technological and market opportunities is brief as these dimensions are covered well in the literature.

## 5.2. Technological opportunity

Schumpeter does not, in fact, examine technological opportunities as he considers them unlimited. Technological opportunities come from inventions that are external to his scheme. He assumes that the supply of inventions, unlike the supply of innovation, is constant (Oakley, 1990).<sup>19</sup> Innovative opportunities are realised at or near

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<sup>17</sup>However, inventions or the state of S&T, which is an important basis for innovation, are exogenous to Schumpeter's model.

<sup>18</sup> For example, see North's (1993: 2) definition of institutions set out in his Nobel Prize lecture: 'Institutions are the humanly devised constraints that structure human interaction. They are made up of formal constraints (e.g., rules, laws, constitutions), informal constraints (e.g., norms of behaviour, conventions, self-imposed codes of conduct) and their enforcement characteristics. Together they define the incentive structure of societies and specifically economies'.

<sup>19</sup> Oakley (1990: 117) argues that Schumpeter saw potential entrepreneurial agents as facing a more or less given and unlimited 'pool' of inventions and relevant knowledge. 'They [possibilities] are always present, abundantly accumulated by all sorts of people. Often they are also generally known and even discussed by scientific or literary writers. In other cases, there is nothing to discover about them, because they are quite obvious'.



equilibrium because this provides the greatest opportunity for realisation of entrepreneurial rents. So for Schumpeter, technology opportunities are exogenous to the economic system, while innovation opportunities are endogenous, i.e. their supply is influenced by market demand (Langlois, 2002: 4). However, as inventions are economically irrelevant unless they are turned into innovations we can conditionally interpret that Schumpeter perceived entrepreneurship ultimately as a function of technological opportunities, which are latent and are exploited in near equilibrium situations. For Schumpeter, the function of the entrepreneurship 'is to reform or revolutionize the pattern of production by exploiting an invention or, more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of materials or a new outlet for production, by reorganizing an industry' (Schumpeter, 1942: 84). However, in his analyses he confined himself to technological innovations, both process and product.

Distribution of entrepreneurship opportunities over time is not even, but varies significantly in different historical periods. This proposition, which arises naturally from Schumpeter's scheme, conflicts with Baumol's (1986) argument that the supply of entrepreneurship is constant, but that the type of entrepreneurship varies. Schumpeter's bunching hypothesis has been elaborated through analysis of the long-term structural determinants of technological opportunities in Freeman and Perez (1988) and Perez (1983). Perez (2003) develops this further by bringing into the logic of long-term techno-economic structural change, the role of productive and financial capital. Production capital is fixed and knowledge-bounded, while financial capital is flexible and mobile. Their functional separation guarantees dynamism in the market system and produces dynamics related to the coupling and uncoupling of their relationship, which varies along different stages of the technology cycle.

Our understanding of technological opportunities has been further enriched through research on sector specific technological regimes in which sector specific differences in technological opportunities operate as one of the determinants of differences in technological regimes (Breschi et al., 2000). Shane (2003) reviews a large literature on entrepreneurship on the basis of which he concludes that 'industries differ in the entrepreneurial opportunities that they create, with some industries at some points in time being more fertile grounds for entrepreneurial activity than others' (Shane, (2003:19). Studies of business demographics (OECD, 2003: Ch. 4) have shown that the cross-industry variation for entry and exit rates is exceptionally high in young ICT related services sectors, but a lot lower in more mature industries. Thus, some of Schumpeter's predictions are corroborated.

In summary, technological opportunities are essential to entrepreneurship as without them product and process innovations could not be realised. The question is whether these opportunities are permanent and unlimited or whether they are localised. Research since Schumpeter has shown that technological opportunities are localised and clustered in specific areas and bunched in specific periods.<sup>20</sup>

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<sup>20</sup> For a state-of-the-art review see Fagerberg (2005). For the theory of localised technical change see Antonelli (1995).

### 5.3. Market opportunity

The role of market opportunities in entrepreneurship is central to the views of the Austrian economists, and especially Kirzner. The point of departure for them is the uneven distribution of economic information across economic agents, which creates multiple arbitrage opportunities in which products and resources are shown to be incorrectly valued in their current uses (Hayek, 1945). The entrepreneur exploits these disequilibria or distortions in the market, to produce a new equilibrium (Kirzner, 1973). Uncertainty and asymmetric information underlie the market process that leads to different perceptions of market opportunities. As prices do not contain information about future goods and services, future technology and potential new entrants entrepreneurs are forced to make conjectures about the causes of price movements. If their conjectures are correct they have discovered new intertemporal and interspatial differences in demand and supply, which give rise to temporary entrepreneurial rents.

If market opportunities were the only determinant of entrepreneurship we would expect that entries would be driven by relatively high profits in a given industry, and exits would occur primarily in sectors with relatively low profits. Hence, there would be a negative cross-sectional correlation between entry and exit rates. However, a stylised fact in business demographics is that entry and exit rates are generally highly correlated across industries, in both the OECD and the developing countries (Bartelsman et al., 2005). The process of ‘creative destruction’ that occurs suggests that there are other factors, such as technological and institutional opportunities, that drive process of new firm formation and exits. Differences in entry/exit rates may also be interpreted as differences in institutional opportunities across different countries controlling for market and technological opportunities. This is not to deny the relevance of market opportunities in understanding the dynamics of entrepreneurship, but rather to point to the multi-dimensional nature of the opportunities.

The existence of market opportunities is not on its own a guarantee that technological opportunities will be realised. In fact, as Hirschman (1958) argues, excessive alertness to new opportunities may lead to the postponement of perfectly good projects on the grounds that far more profitable schemes are bound to exist. As ‘the prospective profit rate on currently proposed projects does not come up to their (exaggerated) expectations ... [entrepreneurs] ... hold money or easily realized assets because they expect the profit rate on tomorrow’s ventures to be higher than that of today’s ventures, just as according to liquidity preference theory some investors are holding money because they anticipate higher interest rates’ (Hirschman, 1958, p. 20). So, the market-technology opportunities relationship is not necessarily complementary; it is dependent upon type of market incentives, i.e. on institutional context or institutional opportunity. Also, for the discovery of opportunities the price system may not be all-important; however, on the experience of post-socialist economies it matters for the exploitation of opportunities (Francicevic, 2001).

To sum up, the (non)existence and the type of market opportunities may greatly impact on the nature of entrepreneurship that emerges which in its turn may be greatly influenced by the role of the institutional system in conveying information and creating incentives among similar or identical technological opportunities. Kirzner’s analysis is based on an environment in which entrepreneurial opportunities already

exist; he does not take account of undeveloped markets. However, in transition economies and also in new technological areas, the market formation function is usually undeveloped. Market opportunities only exist where needs have been articulated. Yet, the process of articulation is deeply connected to the (non)existence of institutional opportunities.

#### **5.4. Institutional opportunity**

Market and technological opportunities have been accepted in the literature as important determinants of entrepreneurship. However, the role of institutional opportunities has not been explicitly taken into account in this context. Both Schumpeter and the Austrian economists abstracted from the institutional context of the market economy, or only briefly touched on this aspect,<sup>21</sup> and mainstream treatments of institutions as constraints rather than as opportunity sets of interdependent transacting partners (Schmid, 2004), have played a role. This is somewhat surprising given the current view that without the rule of law, including the property rights and the enforceability of contracts, capitalism might not have been possible (Baumol, 2002; de Soto, 2000).

In social terms, entrepreneurship involves connecting or bridging two separate social spheres (Barth, 1978/2000). This anthropological counterpart to abstract Austrian theorising on the matching of supply and demand via the equilibrating force of the entrepreneur has long been overlooked. In other words, historically entrepreneurship has been rooted in different economic organisational forms (individuals, banks, corporations, state, and networks). These forms cannot be understood as isolated organisations unrelated to the political economy systems in which they operate. As Ebner (2000: 84) puts it ‘Schumpeterian entrepreneurship is not just simply a personal matter of embodied functions, but to a large extent also an institutional, structural and thus indeed a contextual matter, which is rooted in the historical diversity of various economic forms’.<sup>22</sup>

So, any entrepreneurially driven change is deeply institutional in the sense that it requires and induces a series of institutional changes. Spinosa et al. (1997: 68) provide an example:

The first mass produced cars were not competing with other mass produced cars but with another way of life. The first personal computers were not competing with other personal computers but with our pastoral work habits’ (p. 55)... Thus successful entrepreneurs bring about social change by modifying the style of particular subworlds or the style of the society in general (p. 68).

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<sup>21</sup> Institutional opportunities relate to ‘broad’ NIS i.e. they consists of institutions, norms and rules (formal and informal) that affect (directly or indirectly) the innovation process.

<sup>22</sup> This serves as a point of departure for Ebner for an endeavour that has some similarities with ours – to outline the system of innovation approach to entrepreneurship. Ebner’s (2000) objective is to integrate the disparate Schumpeterian functions of entrepreneur, capitalist, and inventor into a single systemic framework. Our objective is broader as we try to develop a system of innovation approach to entrepreneurship, which is framed as an outcome of the simultaneous presence of three overlapping opportunities: technological, market and institutional.

Entrepreneurship creates new institutional structures, but also becomes a part of them. For example, the Bill Gates phenomenon has impacted on the social environment of urban elites worldwide, and entered their economies independently of previous preferences and constraints. This induces a chain of institutional changes which eventually change the style of practices in at least some socio-economic domains.

In contrast, from the narrow Schumpeterian and Austrian perspectives, technological opportunities and market opportunities are institutionally free. As Harvey and Metcalfe (2005: 5-6) point out:

Schumpeter spends little time on the instituted basis of the market economy, which is, at it where, taken for granted. Markets are there without explanation even though one of the classes of possible new combinations that he identifies is the discovery of new markets. Rather Schumpeter's concern is with why that given system produces continuous economic change, a transformation in terms of human activity is not explained by the revealing economic theory, essentially the Walrasian account of market equilibrium or we prefer to say market order.

Thus, 'Kirzner looks at the establishment of market order while Schumpeter looks at the transformation of market order' (Harvey and Metcalfe, 2005: 9). The issue of market formation does not exist as it is solved by the entrepreneurs themselves who automatically will create markets as long as they are not blocked. As we have already pointed out Schumpeter does not explicitly take account of how differences in the economic environment affect entrepreneurship. Although in later work he states that 'every social environment has its own ways of filling the entrepreneurial function' (Schumpeter 1949/1989: 260 cited in Fagerberg, 2003) he largely abstracts from the organisational dimension of entrepreneurship.

As Chris Freeman has pointed out on many occasions, the antecedent to the systems of innovation approach was Friedrich List (1909). In his book 'The National System of Political Economy' he was the first to point to the importance of national technological capabilities, to the importance of what we would today call NIS, for individual businesses, and to the trade off between static allocative and dynamic allocative efficiency.

List (1909) distinguished between the causes of the wealth and wealth itself. He finds the causes of wealth in *the power of producing wealth* (immaterial capital and productive power) which today we would describe as technological capability. In his arguments against Adam Smith he pointed out that mere accumulation is of minor importance compared with the organisation of the productive forces of society. In 1909 he wrote that:

The present state of the nation is the result of the accumulation of all discoveries, inventions, improvements, perfections, and exertions of all generations which have lived before us; they form the mental capital of the present human race, and every separate nation is productive only in the proportion in which it knows how to appropriate these attainments of former generations and increase them by its own acquirements ... (List, 1909: 113)

And that:

The prosperity of a nation is not ... greater in the proportion in which it has amassed more wealth i.e. values of exchange but in the proportion in which it has more *developed its power of production*. Although laws and public institutions do not produce immediate values, they nevertheless produce productive powers and Say is mistaken if he maintains that nations have been enabled to become wealthy under all forms of government, and that by means of laws no wealth can be created. (emphasis added) (List, 1909: 25)

List was aware of the trade off between short term and long term efficiency, pointing out that 'from the national standpoint of productive power the cheapness of the moment might be far more than counterbalanced by the losses of the future measured by the loss of productive power'.<sup>23</sup> As a result, 'the nation must sacrifice and give up a measure of material property in order to gain culture, skill, and powers of unified production; it must sacrifice some present advantages in order to insure itself future ones' (List 1909: 24). List is aware of the importance of 'broad' NIS when he states that 'we can scarcely conceive of any law or any public legal decision which would not exercise a greater or smaller influence on the increase or decrease of the productive power of the nation' (List, 1909: 12).

So, List was the first to develop the idea that the national system of political economy matters for growth. The NIS is sub-system of the national system of political economy and it embodies the diversity of institutional arrangements, i.e. constraints and opportunities. From the perspective of entrepreneurship we need to explain why NIS represents an institutional opportunity. In order to clarify this point we introduce into the discussion the understanding of institutions in Schmid's (2004) comprehensive work.

Schmid (2004: 1) defines institutions as 'human relationships that structure opportunities via constraints and enablement. A constraint on one person is opportunity for another. .... Institutions define the opportunity sets of interdependent transacting parties'.

This understanding of institutions originates from the nature of the technology and products, which generate interdependencies.

Human interdependence is conditioned by the inherent characteristics of goods (resources). The possibility for one's person actions to affect the welfare of another person is a function of the physics and biology of goods and services. For the purpose of analyzing the impact and change consequences of alternative institutions, these inherent characteristics are given, even though over time, technology may change them. (Schmid, 2004: 90)

From our perspective, it is important to consider Schmid's (2004) point that current interdependencies are determined by technology, but also that technology may change them. While creative destruction does play a role Schmid points out that 'it is institutions that influence who gets created and who gets benefits and bears the costs.

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<sup>23</sup> As quoted in an Introductory Essay by J. Shield Nicholson?? Do you need a year??

Exclusion costs (appropriability), economies of scale, transaction costs, and uncertainty are among the inherent situation variables relevant to understanding the impact of alternative institutions and both technological and institutional change<sup>24</sup> (Schmid, 2004: 214).

For Schmid (2004: 199) ‘institutions operate on or within other determinants of technical change like relative prices, appropriability, firms and industry specific routines and standard operating procedures, transaction costs, market structure, irreversibility of technological path, and lock-in’. Technological change, Schmid contends, ‘is a function of which competing interests can control the process and this is affected by institutions that influence whose preferences count’ (Schmid, 2004: 207). However, he adds that ‘the point is that this process of creative destruction seldom compensates the would-be losers, and their attempts to avoid losses affect the path of change. Technological change has winners and losers, and institutions affect the outcome of the struggle and the content and timing of that change’ (Schmid, 2004: 208).

If we apply this reasoning to our context then institutional opportunities are those that benefit entrepreneurs or innovation constituencies more generally. For example, regulation may hinder the prospects of one entrepreneur, but might open up opportunity for another. Constraints to one’s business in terms of protection, are opportunities for consumers or workers. We can imagine situations where markets and technological opportunities are visibly present and constraints are primarily due to the absence of institutional opportunities. Also, the structure of market opportunities and entrepreneurial actions is embedded in a web of values, beliefs, norms, traditions, and formal and informal relationships (i.e. in NIS) (cf. Corbetta et al., 2004). This points to the importance of common beliefs and mutuality of expectations. For example, Casson (1982: 346) argues that ‘equilibrium in the market for entrepreneurs is achieved not by contract but by conjectures. Entrepreneurs must conjecture the behaviour of other entrepreneurs, and only if these conjectures are mutually consistent will equilibrium be achieved’. We would argue that what underpins these conjectures are mutually consistent sets of values, beliefs, norms, traditions and relationships.

As Baumol (1990) points out, the rules of the game influence the payoffs for different kinds of entrepreneurship. Baumol’s (1968; 1990) thesis is that the supply of entrepreneurs in society is constant, but that the societal value of their self-interested ingenuity varies according to the rewards they can expect. This creates a distinction between productive and destructive (unproductive) entrepreneurship.<sup>25</sup>

There is also an argument in the varieties of capitalism literature (bank vs stock market based financial systems), that some types of NIS promote better entrepreneurship than others. For a review see Himmleweit et al. (2001: Ch. 17).<sup>26</sup> Bowen (2005) explores the institutional factors that influence different types of start-ups (job creating and international).

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<sup>24</sup> Discussions on the income distribution effects of IT and whether global income inequalities are trade or technology driven can be better interpreted within this framework.

<sup>25</sup> Aidis (2005) discusses the relevance of Baumol’s thinking in the context of transition economies.

<sup>26</sup> For a rejection of the relevance of this dichotomy see Thorsten and Levine (2002)

The importance of the institutional context and institutional opportunities was also highlighted by Kirzner (1980: 10), who argues that there are ‘important differences between different economic systems in respect of their success in harnessing entrepreneurial alertness for making error free decisions’. He talks about ‘the varying degree of success with which alternative economic systems can inspire entrepreneurial alertness ‘(Kirzner, 1980: 12).

Metcalf (2003: 35) succinctly articulates this point:

an understanding of the entrepreneurial function cannot be separated from the nature of the economic systems in which it is exercised. Its nature and consequences are embedded in the wider system of market and non-market economic institutions. The prevailing features of a market economy produce a particular spectrum of entrepreneurial activities in a different set of institutional arrangements, say of labour managed firms, or of stakeholders capitalism, the entrepreneurial spectrum will take on a different scale because those systems give different meaning and content to entrepreneurial activity and provide different incentive systems from shareholders capitalism.

Shane (2003) elaborates extensively on the effects of the institutional environment on opportunity exploitation. He discusses a variety of variables from the *economic environment* (income, capital gains and property taxes, economic growth and societal wealth, etc), *political environment* (freedom, rule of law and property rights, decentralisation of power), *socio-cultural environment* (social desirability of entrepreneurship, presence of role models and specific cultural beliefs).

The role of institutional opportunities in the emergence of new industries has been detailed in the sociological and organisational literature. These works argue that new industries based on radical product innovations, require constitutive legitimacy to flourish. Rao (2004) shows that the creation of a new industry is a project in which ‘institutional activists’ play a central role in securing constitutive legitimacy for the new industry. She argues that

in contrast to economic entrepreneurs who bear uncertainty in return for profit by establishing new organizations ..., institutional activists are ideological champions who take risks and invest themselves in fighting for a larger cause or a public good .... Institutional activists secure sociopolitical legitimacy through private lobbying of governmental operatives ... and gain constitutive legitimacy when they make claims about the usefulness and validity of the radical product embodying the new industry .... (Rao, 2004: 360)

She points out that the roles of trade associations, professionals, and consumer activists in the legitimation process can vary across new industries.

In some industries, free-rider problems may impede collective action by producers, and in others, trade associations may only be formed later in the evolution of new industries. Similarly, pre-existing professional infrastructures may be weak in some cases, and new industries may actually promote the birth of new professions. (Rao, 2004: 380)

A preponderance of institutional factors hindering and promoting technological opportunities, is essential to our understanding of how technologies are introduced and then diffused. Sine and David (2003) use the example of the introduction of energy efficient technologies into the US electric power industry. In this industry the energy crisis forced the abandonment of regulated geographical monopolies and reliance on centralised generators only after a change in ‘institutional logic’, which created ‘a fertile environment for entrepreneurship and ultimately a new set of organizational forms and practices’<sup>27</sup> (Sine and David, 2003: 192:). Sine and David (2003: 205) also point out that the energy crisis ‘did not result in the creation of new technological alternatives so much as the delegitimation of existing institutional logics, and increased awareness of pre-existing technological solutions (e.g. alternative energy and cogeneration)’.

Thus, we can see that institutional opportunities, although not much theorised in relation to entrepreneurship, are essential in matching technological and market opportunities. The variety of the perspectives on institutional opportunities highlighted here suggests that institutions structure interdependencies among agents and thus mediate the coupling between market and technology opportunities. They structure interdependencies among agents.

In the next section, we discuss the linkages between these three dimensions and why their interaction, if favourable, generates entrepreneurship as a systemic phenomenon.

### **5.5. What makes entrepreneurship systemic?**

Technology is a systemic phenomenon (Fagerberg, 2005). Its systemic nature stems from the nature of the interactive innovation model (Kline and Rosenberg, 1986), which involves interactions within corporations, but also with knowledge organisations outside the firm (competitors, partners, universities, public R&D institutes, etc). Linkages and complementarities between different organisations and technologies are key drivers of innovation processes. Institutional setups within which these interactions take place are recognised as technological (Carlsson and Stankiewicz, 1991), Jacobsson), sectoral (Malerba, 2004), regional (Braczyk et al., 1998) or national innovation systems (Nelson, 1993, Lundvall, 1992, Edquist, 1997).

While innovation and technology are seen as systemic phenomena, entrepreneurship has traditionally been perceived as primarily an individual act. Although there is increasing understanding that successful entrepreneurship usually involves more actors than just the entrepreneur, and that its analysis must take account of the behaviour of these other actors (Swedberg, 2000, p. 37), the implications of this fact have not been widely acknowledged by economists and practitioners, despite the fact that historical case studies provide evidence of the relevance of social networks to entrepreneurship (see, for example, Kirby, 1993). The network dimension, in the modern meaning of network, has only recently been recognised in analytical terms, primarily through the application of network theory to entrepreneurship (see Burt, 1993/2000, 2005).

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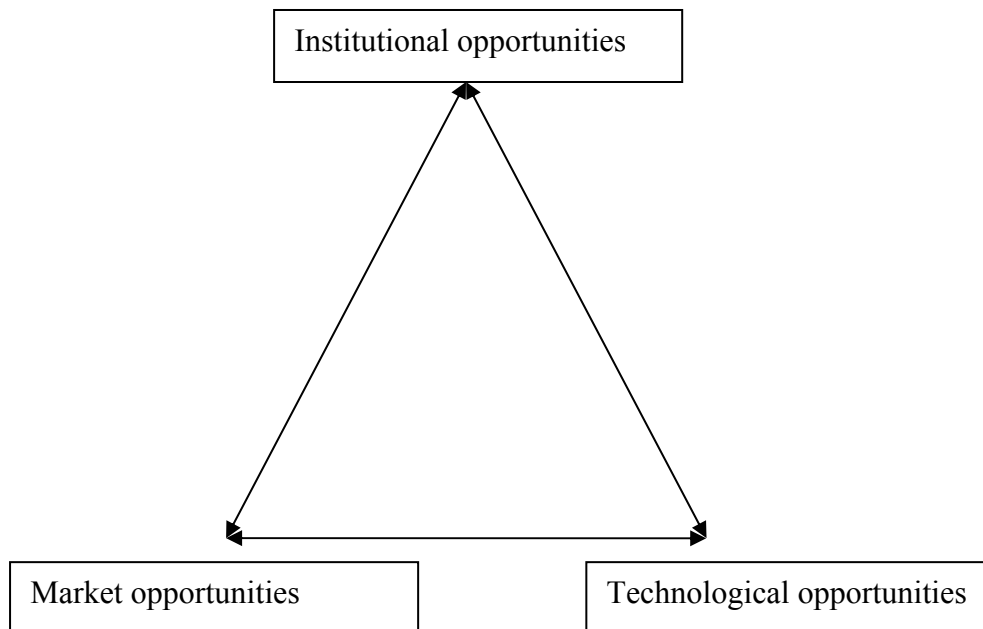
<sup>27</sup> Sine and David (2003: 188) define institutional logics as ‘socially-constructed assumptions, values, and beliefs that define formal and informal rules of behaviour and guide interpretation about why certain structures and practices exist’.



To understand the dynamics of entrepreneurship at different levels we need to control for the effects of opportunities. In his analysis of individual entrepreneurship and the opportunities nexus, Shane (2003: 269) points out that ‘if researchers fail to control for the effect of opportunities when measuring the effects of individual differences on the likelihood of opportunity exploitation than the variance attributed to motivation might actually be an artefact of unobserved correlation between the motivation and the expected value of the opportunity’. We would argue that the same logic applies when approaching entrepreneurship from the NIS perspective, which is our reason for discussing separately the role of the three types of opportunities separately. However, unlike Shane (2003) who sees his individual components as being unrelated, we believe that they are closely connected and interact. Entrepreneurial opportunity is a phenomenon that emerges as a result of the interaction between the three types of opportunities, and which develops into a systemic and multi-level event.

Our proposition is that the final outcome, in terms of entrepreneurship, is the result of alignment between these three components. Exploitation of technological opportunities is dependent on market opportunities and on institutional opportunities. On the other hand, if technological opportunities are not present, i.e. the technology has not been commercialised, it may not be possible to exploit market opportunities. Similarly, institutional opportunities may hinder the coupling between technological and market opportunities. Figure 1 depicts these relationships.

Figure 1: Technology based entrepreneurship as successful matching between three types of opportunities



Metcalf (2003: 33) articulated this as ‘The dynamics of modern capitalism lies in the combinatorial growth of knowledge [*cf. technological*] and investment [*cf. market*] opportunities combined with the instituted frameworks [*cf. institutional opportunities*]

of the market economy that taken together simultaneously stimulate and enable entrepreneurial activity’.

In the research on entrepreneurship these individual components have been treated either separately or as substitutes. In our view they are not substitutes, but complements. For example, technological opportunities are unlikely to be entrepreneurial unless market opportunities are present, and vice versa. In his interpretation of Schumpeter’s theory of motion Oakley (1990) argues that Schumpeter was fully aware of two of these three components: technological opportunity and market (demand).

Schumpeter has his potential entrepreneur looking in the two directions when seeking to become active. They look to the demand side in order to perceive extant ‘needs’ that are not catered for at all, or are judged to be somehow less than adequately catered for, as well as to form ideas about ‘needs’ that might be created. In these cases, the expectation must be that the demand will meet the entrepreneurs’ own test of economic viability. As far as the other ‘direction’ is concerned, it is the availability of technology and other means to satisfy ‘new needs’ that the entrepreneurs must look for. Here too, they may need to generate what they require, but Schumpeter’s judgement was that more usually satisfying a ‘need’ becomes economically viable only if the means can be drawn from pre-existing inventions and knowledge with only some limited amount of creative input. (Oakley, 1990: 118-119)

As already mentioned, Schumpeter underestimated the role of institutional opportunities and the organisational aspects of the innovation process, although he did not ignore them.

Given the linkages between these three forms of opportunity we need to understand what makes them systemic? Their simultaneous presence is enabled by the features of the NIS and by pervasive complementarities that operate at the national political economy system. The absence of these complementarities may lead to misalignment or coupling failure, between market, technological and institutional opportunities.

From the NIS perspective, the focus is not on the individual components, but on how they relate to each other, i.e. whether they are complementary. Complementarities may be understood as situations where doing (more of) any activity increases the returns to doing (more of) another (Milgrom and Roberts, 1995: 181). The essential feature of complementarities is that ‘the choice variables tend to move up or down together in a systematic, coherent fashion in response to environmental changes’ (Milgrom and Roberts, 1995: 185). This phenomenon was first noted by Hirschman (1958), who proposed the theory of unbalanced growth. Hirschman started with the factors and resources that are latent and conditionally available, rather than being completely absent or scarce. This thinking is in line with our view of entrepreneurship as being conditionally available or latent. In other words, entrepreneurship should not be interpreted as the result of scarcity of entrepreneurial talent (cf. Casson) (missing component), but as the result of a (mis)match with other components. The focus is on what Hirschman would call the ‘binding agent’, or on those elements that can improve the linkages between the three components. Lack of entrepreneurship is the result of mismatches rather than of scarcities. For Hirschman (1958: 6) the solution was to

look for “pressures” and “inducement mechanisms” that will elicit and mobilize the largest possible amounts of these resources’.<sup>28</sup>

This perspective has been rejuvenated through the notion of network alignment (von Tunzelmann, 2004). Network alignment means that ‘different elements are pulling in similar directions to one another, even when their purposes differ’ (von Tunzelmann, 2004: 25). Network failures arise because: i) the network relevant to a particular resource flow is missing; ii) the network is present, but anti-developmental; or iii) the networks for different resource flows are mutually inconsistent (von Tunzelmann, 2004).

In our context a mismatch among the three types of opportunities may be due to: i) one of components (markets, technology or institutions) being undeveloped; ii) wrong orientation of one of components (anti-entrepreneurial institutional system, technology lock in; closed markets); or iii) mis-matches between technological, market and institutional opportunities, which have developed in isolation and thus are not compatible. We assume that the rate of mis-matches will be smaller in some contexts than in others, in terms of matching of the three types of opportunities. This is a systemic property of NIS, which cannot be expressed as scarce factor, and which is based on compatibilities between different sub-systems of NIS and compatibilities between NIS and the global economy.

At a more disaggregated level, it is clear that opportunities follow one upon the other rather than being substitutes. For example, east European experience suggests that the price system does not matter so much to the discovery of opportunities, but is important for the exploitation of opportunities (Francicevic, 2001). Cheah, (1990: 343) argues that Schumpeterian entrepreneurs who, by innovating and by destroying equilibrium, give rise to uncertainty, are actually widening the scope for Kirznerian entrepreneurs. ‘Instead of treating these as contradictory concepts between which we are forced to choose, it would be more fruitful to perceive Schumpeterian and Austrian entrepreneurship...as opposites and yet complements to each other’. Cheah (1990) thus points to sequential complementarity; however, the issue is how can they complement one another simultaneously. This highlights the scale of the trade offs involved among different types of opportunities and the difficulties involved in matching them. This highlights why the emergence of a dynamic NIS is so rare.

In this section, we have outlined the NIS approach to entrepreneurship, which is eclectic, integrative and evolutionary. Within our framework entrepreneurship is seen as a function of disequilibria in the market, technological, and institutional opportunities. These three types of opportunities are matched and mediated through national systems of political economy or, in modern parlance, through ‘broad’ NIS. This framework is eclectic as it builds on different traditions of research on entrepreneurship in the social sciences. It is integrative because it sees entrepreneurship as a multidimensional phenomenon whose occurrence may be understood through several dimensions (technology, markets and institutions), which should be brought together in empirical research. It is evolutionary in that it interprets entrepreneurship as being a highly context dependent process, driven by interaction

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<sup>28</sup> This view is in line with the functional perspective on systems of innovation as developed in Bergek et al.’s (2005) methodology (see Section 3).

among structural factors (market, technology, institutional opportunities) and how they complement each other (contingent process).

## 6. POLICY IMPLICATIONS AND POLICY ISSUES

In this section we discuss the policy implications arising from our analysis. We argue that the implications for policy are highly dependent on the underlying perception of entrepreneurship, which is dependent on the emphasis given to each of opportunities discussed above. The policy options outlined are predominantly focused on one type of opportunity. Policy related to technology opportunities focuses on innovators and on subsidising R&D to enable entrepreneurs to develop and commercialise new technologies. Market opportunities frameworks are focused on entrepreneurs as arbitrageurs and on the obstacles to market intermediation, entry and exit. The institutional opportunity perspective focuses on the institutional obstacles to entrepreneurship and on institutional support for entrepreneurial activity. We argue that the weaknesses in these approaches lie in their partial treatment of entrepreneurship as being driven by a single factor rather than being determined by their complementing interactions. We argue for a fourth, systemic view of entrepreneurship, which encompasses all three dimensions.

### *6.1. Market opportunities policies for entrepreneurship*

Policy that perceives scarcity of entrepreneurial (market) opportunities as the key issue focuses on deregulation and increased market transparency. In this view, undistorted and transparent markets are seen as essential to the exercise of entrepreneurship. This line of policy thinking is basically grounded in the neo-classical and Austrian economics views. For Hayek (1945: 524), undistorted and transparent markets are essential to enable ‘limited individual fields of vision [to] sufficiently overlap so that through many intermediaries the relevant information is communicated to all’.

This, market opportunities view of entrepreneurship dominates the reports of Freedom House, GEM, the World Economic Forum (WEF) competitiveness reports and World Bank ‘Doing Business’, all of which emphasise entry and exit barriers in business, as key impediments to entrepreneurship.<sup>29</sup> For example, the World Bank’s ‘Doing Business’ reports point to high costs, delays and barriers to owning property, starting-up businesses, declaring bankruptcy, protecting investors, enforcing contracts and legal rights and in laying off workers as the main barriers to entrepreneurial activity. The 2005 report estimates that improving from the quartile of countries with the worst business regulations to the best would raise annual growth by 2.3 percentage points (Djankov et al., 2006; World Bank, 2005). This assumes that the market opportunities created by the removal of barriers would automatically generate benefits, irrespective of institutional and technological opportunities. As Hobday and Perini (2005) point out, no correlation between over regulation and lack of development is actually established. ‘The policy assumption that there is a linear causal relationship between excessive regulation and low rates of development is questionable. It may be that the

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<sup>29</sup> A completely different policy stance, but based on similar concerns, would be to create market opportunities through unequal access to the market. Hikino and Amsden (2003) argue that this pattern of initial asymmetries, which were then corrected, were essential for East Asian entrepreneurship.

style, stage and level of development leads to high regulation and low innovative activity, rather than *vice versa*' (Hobday and Perini, 2005: 23).

Exit barriers are somewhat less of a problem, due to the difficulty of monitoring them, and the less well developed understanding of their part in processes of creative destruction. In view of the latest results of business demographics studies, which point to small differences in entry/exit rates across a variety of countries (see Bartelsman, 2004, 2005), an exclusive policy emphasis on this aspect of entrepreneurship seems somewhat misplaced. Also, there is underestimation of sector specific barriers to entrepreneurship, as opposed to general entry/exit barriers, which seem actually to be a greater hindrance to business. Some of the McKinsey Global Institute reports have highlighted their importance in developed (UK) as well as in less developed economies (India, Russia)<sup>30</sup>.

## *6.2. Institutional support policies for entrepreneurship*

This policy perspective assumes that an efficient market economy requires as a minimum an institutional system that effectively enforces property rights and the exchange of property titles. In its minimalist form this view favours strong enforcement of property rights and privatisation. In its activist form it favours policies that support entrepreneurship by pointing to market failures in financial and entrepreneurial skills markets. This latter view would justify support to small and medium sized enterprises (SMEs) and the venture capital (VC) industry. Such policies are considered to complement market opportunity policies for entrepreneurship.

Hernando de Soto's (2000) ideas on the importance of individual property titles for poor people has been extremely influential in policies promoting individual entrepreneurship, especially in underdeveloped economies. In the absence of secure property rights poor people cannot get ownership over the assets they use, are denied access to finance and cannot legalise their activities. Individual property titles are an essential institutional precondition for entrepreneurship and their effects can be substantial (see de Soto, 2000, for evidence.). However, there is also evidence that legalisation of individual property titles by itself does not solve the problem, and the market value of the newly legalised property generally remains low. In cases where the value of property has dramatically increased it has led either to forced evictions or gradual takeover by richer entrepreneurs.<sup>31</sup> By pushing for one – institutional - solution to the problem of entrepreneurship, the market opportunity aspect of the problem has remained unchanged, which may significantly weaken the effects of this policy.

A possible solution suggested by Geoffrey Payne, a British urban planning consultant, would be to temporarily insulate slums from the commercial land market by granting

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<sup>30</sup> See <http://www.mckinsey.com/knowledge/mgi/reports>

<sup>31</sup> For an interesting debate on the effects of De Soto's inspired policies see John Gravois 'The De Soto Delusion', Updated Saturday, Jan. 29, 2005 at <http://www.slate.com/id/2112792/> as well as replies from his supporters at <http://www.techcentralstation.com/020305D.html>. See also Hobday and Perini (2005).

informal neighbourhood groups land rights for a certain period of time.<sup>32</sup> During this period the value of the property could be increased, and the group land title could be subdivided into individual titles. In terms of our model, the solution involves creating an institutional distortion (group land rights) and then developing market opportunity by investing in improvement to the acquired land assets. However, it is likely that true entrepreneurial opportunity would only arise if the poor people were given decent education and training, providing the necessary third element – technological opportunity – required to grasp the entrepreneurial opportunity. In a nutshell, institutional opportunities (cf. property titles) are not sufficient if market and technological opportunities are not simultaneously present.

In countries where property rights are relatively well enforced, programmes of support for entrepreneurship through support to SMEs are quite widespread. As the OECD (2003: 9) states in the OECD group of countries ‘the scope, number and growth of entrepreneurship support programs are striking’. In addition, bilateral and multilateral development agencies operating around the globe advocate micro-enterprises as a vehicle for poverty alleviation. Assessment of policies to support entrepreneurship at the local level shows that ‘while enterprise creation and development is clearly a critical component of local growth and development it does not constitute a developmental panacea’ (OECD, 2003: 13). Problems such as displacement (when competition from new firms causes a loss of output or employment in existing enterprises), small employment effects (at least over the short term), poor quality employment, and deadweight effects (when a programme has effects that would have occurred in its absence) are among those frequently mentioned in evaluations of support programmes.

Aggregate analysis of SMEs as determinants of growth suggest that small and medium sized firms do not have a particularly beneficial impact on the incomes of the poor (Beck et al., 2003). SMEs are characteristic of fast growing economies, but they are not determinants of economic growth (ibid).

Thus, there are a variety of factors that need to be in place for the successful promotion of entrepreneurship through SMEs. In the absence of market opportunities alongside technological opportunities, which include entrepreneurial capabilities and knowledge, the effects of single-dimensional policies will be limited.

### *6.3. Supporting technological opportunities for entrepreneurship*

Within this policy the lack of technological opportunities is seen as an important barrier to technology based entrepreneurship. It points to a need for funded R&D, and highlights the importance of scarce entrepreneurial talents. This is in line with much EU policy on entrepreneurship, exemplified in various horizontal policies and institutional support for entrepreneurship (S&T parks and innovation centres). These types of entrepreneurship policies were inspired by the rise of Silicon Valley and the idea that growth of new technology based firms supported by VC is the model to be aspired to. In countries, where new technology sectors have been important this model of support is justified. However, to support technological activities that are

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<sup>32</sup> See <http://www.slate.com/id/2112792/>

behind the frontier, this radical innovation model is not appropriate. In countries where the majority of innovative firms are in non-high tech industries, this model would skew the policy focus on to a small number of new technology based firms. A large number of firms involved in small, incremental improvements to existing products and processes based on engineering and technical skills rather than R&D would be overlooked by such policies. Also, a focus on new technology based firms would exclude large firms and subsidiaries of MNCs, which are more frequent innovators than SMEs.<sup>33</sup>

#### *6.4. Innovation systems based policies towards entrepreneurship*

The main problem with the policies outlined above lies in their one-dimensional view of entrepreneurship. By pushing one aspect of entrepreneurship, be it market opportunity, institutional constraints or technological constraints, as the key, they are inevitably constrained by the other two dimensions of entrepreneurship, which are not taken into account. For example, policies to support SMEs that view SMEs in isolation should emphasise the links and synergies between small, medium and large firms. Policies aimed at generating new market opportunities for nascent entrepreneurs through deregulation and liberalisation are constrained by insecure property rights (cf. de Soto's point) or by the weak capabilities of SMEs which do not allow them to exploit these newly created opportunities. Policies that are focused on support to new technology based firms are often constrained by undeveloped markets and regulatory uncertainty. Based on the logic underlying our conceptual model, policies for entrepreneurship should take account of all three dimensions or should try to enhance complementarities between the three types of opportunities – market, institutional and technological.

The fourth policy perspective – the system of innovation perspective – would allow the entrepreneurship problems to be more comprehensively addressed. Within this perspective, the poor connectedness within NIS is often seen as a key policy issue. For an elaboration of this view in the context of the EU see CEC, (2004: ch. 6). Here, the nature of linkages is considered to be dominant over the strength of actors. In a recent critical analysis of EU science, technology and innovation Dosi, Llerena, Labyini (2005) have rightly pointed to weak European corporations as the major problem, and have criticised the dominance of the so called 'European paradox' i.e. weak linkages between science and technology, as the problem. In the context of the central and eastern Europe McGowan et al. (2004) pointed to the weakness of domestic firms rather than the poor linkages in the innovation system as the key obstacle to industrial upgrading. However, none of these approaches explicitly looks at the entrepreneurial function as a constitutive element in the analysis of systems of innovation.

The systemic policy view is embodied in the *functional* innovation system view, and is developed the innovation systems research of Bergek et al. (2005), Carlsson et al. (2004), and Jacobsson (2005). This views leads to systemic policies aimed at remedying poor functionality of innovation systems by strengthening inducement mechanisms and removing blocking mechanisms. From the NIS view, the focus here

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<sup>33</sup> See also Hobday and Perini (2005) on this point.

is on strengthening the entrepreneurial function (entrepreneurial experimentation) and its interaction with other functions in the national or sectoral system of innovation.

From a system of innovation perspective this policy view is the most appropriate as it departs from the systemic and functional view of entrepreneurship. Other policy perspectives are partial and only tangentially address the key issues of entrepreneurship from systems of innovation perspective. However, the functional approach to NIS-entrepreneurship is also the most demanding of all these approaches in terms of the knowledge required for policy analysis, and the understanding of entrepreneurial functions that is necessary. In this respect, its application is likely to be limited, and confined to sectoral systems of innovation.

So far, we have looked at the policy implications of our analysis through a somewhat technocratic lens by reducing the inherent fuzziness of entrepreneurship to policy implications. However, from our analysis of what makes NIS entrepreneurial (see Section 4) it should be clear that entrepreneurship emerges as a property of firms and of innovation systems rather than as a result of the policy process. It is the overall social and institutional context, or national system of political economy, of a country that ultimately generates different propensities for entrepreneurship.<sup>34</sup> Direct policies for supporting entrepreneurship will thus inevitably be limited, especially if they contradict the structural features of the system of innovation or if they are incompatible with other functions in the innovation system. Entrepreneurship may be affected much more by indirect policies or other features of the system of innovation. This does not make policies supporting entrepreneurship redundant, but suggests that, almost by definition, entrepreneurship is not an easily directed activity.

## **7. SUMMARY AND ISSUES FOR FURTHER RESEARCH**

The NIS literature neglects the issue of entrepreneurship. Entrepreneurship cannot be grasped as a dominantly individual activity with no systemic aspects. In this paper we try to integrate these concepts to define a new research agenda.

We have explained the current absence of entrepreneurship in the NIS literature as a legacy of Schumpeter in terms of abstraction of the institutional environment of entrepreneurship, and the person centric focus, which does not recognise the interdependence between institutions and individuals. This also involves some methodological difficulties in studying entrepreneurship at the macro-level. We have suggested that a common basis for the integration of NIS and entrepreneurship should be functional view of NIS combined with a better understanding of what constitutes the entrepreneurship systemic phenomenon. To this end, we developed three hypotheses about what makes NIS entrepreneurial and what makes entrepreneurship a systemic phenomenon.

From the NIS perspective, we explain entrepreneurship as a systemic phenomenon driven by complementarities between technological, market and institutional opportunities. This framework builds on three research traditions in the entrepreneurship/NIS literature (Schumpeterian, Kirznerian and Listian) which jointly

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<sup>34</sup> For an essentially similar point see Hobday and Perini (2005) who argue that the economic context is a major motivation for entrepreneurial activity.



form a multi-level and multi-dimensional framework for understanding entrepreneurship from an NIS perspective. This, NIS approach to entrepreneurship is eclectic, integrative and evolutionary.

We then developed policy implications which are highly dependent on the three underlying perceptions of entrepreneurship. We argued in favour of a fourth, systemic view, which aims to encompass the previous three dimensions. In light of our analysis of what makes NIS entrepreneurial we pointed to some limitations to entrepreneurship policy. Entrepreneurship is an emerging property of firms and of innovation systems rather than a clear cut and manageable policy variable.

*Issues for further research*

We have outlined a NIS approach to entrepreneurship, which is essential to make the NIS perspective more relevant, and to understand the systemic properties of entrepreneurship. Entrepreneurship is essentially a micro level phenomenon, but, as we have argued, it has strong systemic features. In order to develop this approach further, we would need to conduct a series of case studies at different levels. Three analytical components - market, technological and institutional opportunities - and their inter-relationships should be explored at individual, inter-firm and industry (economy) levels. See Table 1 below.

Table 1: A conceptual framework for case study analysis

	Level of analysis		
	Individual	Inter-firm or network-wide	Industry or economy wide
Market opportunities			
Technological opportunities			
Institutional opportunities			

We do not have ready answers about how to tackle each of the three dimensions in case study and quantitative research as they would require adjustment in each individual case. However, a successful analysis should generate a set of stylised facts, which could qualitatively enrich our understanding of the systemic aspects of entrepreneurship.

Our NIS approach to entrepreneurship is aimed at establishing a research agenda rather than providing answers. In order to deepen our understanding of the systemic aspects of entrepreneurship, which we believe is a relevant policy challenge, several areas innovation and entrepreneurship demand research attention.

First, what are the entrepreneurial and system of innovation functions? We have argued for the functional view of NIS and entrepreneurship; however, our understanding of this activity is still rudimentary. We will likely need to do a series of case studies on entrepreneurial and systems of innovation functions aimed at developing empirically based taxonomies.

Second, what types of entrepreneurship are relevant for what stages of different systems of innovation? Research by a Swedish group (Bergek et al., 2005) seems appropriate for emerging/formative sectoral systems of innovation rather than mature systems.

Third, how does entrepreneurial experimentation relate to other functions in national or other systems of innovation levels? The template provided by Bergek et al. (2005) should be applied to a broader range of sectoral and, possibly, national contexts.

Fourth, how does the destructive phase (de-assembly) of 'creative destruction' take place? As McGrath (2004: 521, 522) points out 'until we do not understand how old combinations of factors of production are dis-assembled we cannot understand the process of creating and implementing new combinations factors of production' and, 'the entrepreneurship literature by and large ignores half of this process. Instead, it has selected to focus primarily on how new combinations come into being rather than to take a more balanced look at how old ones vanish' (p. 522). From the entrepreneurship perspective NIS is the framework that should ensure a balance between creation and destruction, and yet our knowledge of destruction is quite vague.

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