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**Can Innovation Enhance Entrepreneurial Activities of a Region? An Analysis
Utilizing the Entrepreneurial Remedy Model (EREM).**

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Can Innovation Enhance Entrepreneurial Activities of a Region? An Analysis Utilizing the Entrepreneurial Remedy Model (EREM)

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Abstract

There exists in the literature of economics a couple of models which discuss the issue as to how economic growth can be promoted through entrepreneurial activities. One of their models is the Entrepreneurial Recycling Model (or EREC). The model looks at the sources that feed into firms' creation in an economy, namely: entrepreneurial empowerment and knowledge spillover. The model does not encompass innovation activities and its instruments directly. In contrast to the EREC model, the Entrepreneurial Remedy Model (EREM) demands an active role of innovation to create an environment where small and medium size companies (SMEs) are developed. The EREM may provide a conceptual platform which can be used to explain why developed regions of the world have succeeded in maintaining a healthy entrepreneurial environment, while the less developed one have failed to do that. Further, the Open Innovation concept is brought into the discussion connecting innovation to entrepreneurial environment conditions. A question which remains to be tackled has to do with the impact of innovation on the extent of entrepreneurial activities at a regional level. In this paper we will analyze and discuss this topic and provide understanding of the impact of innovation using the EREM. As such, the EREM offers an analytical tool to examine how the macroeconomic conditions impact the creation of new firms within a region or a country.

Keywords:

Open innovation, Entrepreneurial Recycling Model, EREC, Entrepreneurial Remedy Model, EREM, regional development, incubators, start-ups, Small and medium-sized enterprises, SMEs

Introduction

There are variations between societies and their economies in their degree of support to an entrepreneurial environment. To facilitate higher rate of firm start-ups there is a need to provide sources, in form of capital, to the individual with entrepreneurial drive. There are different types of capital which enhance the entrepreneurial capacity of a country. These include three basic types: *Human Capital*, *Financial Capital*, and *System Capital* (Abouzeedan and Bulser 2006). The *System Capital* is a new concept which was proposed by Abouzeedan and Busler (2006). The three types present a single combined component of the total input of a society toward the entrepreneurial activities (ibid). Abouzeedan and Busler (2006) called the combined form of capital which adds up these three components as the “*Innovation Capital*”. Later on Abouzeedan et al (2009) introduced a fourth component to account for the openness and level of willingness to allow for the exchange knowledge and tangible and intangible resources among economic actors in society. Referring to Corley *et al.* (2002), there are variation across countries and industries in the rate of investment in the three types of capital (physical, R&D, and human). These variations explain a significant amount of variation in productivity levels across EU and US industries.

Ballot and Taymaz (1997), investigated the co-evolution of the performance of firms and of the aggregate economy in a complete micro-to-macro simulation model, placing special emphasis on the interactions between human capital and innovation. new business; emergence of new technologies; and new models of business organization. Expenditures in R&D are a waste of resources if firms were not able to transfer them into innovations of commercial value (Ballot and Taymaz, 1997). Rastogi (2000) discussed couple of notions which characterize the world of business of today including: shortcoming life cycle of products; emergence and growth of

The first section of this paper is a general introduction to the topic. The second section looks at the entrepreneurial nature of societies and how that can be connected the innovation capital. The third section touches on the topic of innovation capital and entrepreneurial character of economy. The fourth section discusses the open innovation management. In the fifth section the “Entrepreneurial Remedy Model” is displayed. In

section (6) the impact of innovation to the economical conditions of societies is analysed using the EREM tool. In section (7), conclusions are withdrawn.

Entrepreneurial nature of societies and the innovation capital

In the coming text we will be looking at the entrepreneurial nature of societies and relate that to the concept of the innovation concept.

Human capital

Historically, high productivity industries in the EU and the US are generally characterized by high levels of investment in human capital, enabling workers to absorb the R&D processes and put them to use in value creation in the firm. Increases in labor-productivity should lead to increase in firm competitiveness. In much high growth manufacturing industries in the EU and the US where increases in productivity have been accompanied by increases in employment (ibid). The empirical evidence provided by Coe and Helpman (1995) showed that countries with higher R&D per employee have higher levels of total factor productivity growth. Mankiw *et al.* (1992) introduced human capital explicitly in his production function. It is argued for long that positive economical output is attributed to technological change. Much of the increase in America's output should be attributed to technological change (cs. Abramovitz, 1956; Solow, 1957). According to Adams (1980), technical change increases the relative productivity of human capital if education and other skills assist in the more rapid application of new technology (see Nelson and Phelps, 1966; Welch, 1970; Schultz, 1971). Higher human capital for engineers, researchers, and other categories of workers is needed when new technologies are adapted, especially during the implementation phase (see Bartel and Lichtenberg, 1987). Typically R&D and human capital are merged under the categories of "receiver competence" (Eliasson, 1990), "knowledge base", or "absorptive capacity" (Cohen and Levinthal, 1989, 1990). Timmons (1994) also lists attributes which are more innate

including: high energy coupled with emotional stability, creative and innovative ability, conceptual ability and vision combined with a capacity to inspire.

Referring to Ballot and Taymaz (1997) again, general human capital is transferable and it facilitates the accumulation of specific human capital. This captures the accumulative character of competence building and the importance of receiver competence (Eliasson, 1992). based on the competitive advantages theory, one would think it paradoxical that a country export labor intensive commodities in a time when its wages were relatively high compared to the other countries (Polachek, 1995). Human capital theory actually has roots at least back to Sir William Petty who considered labor ‘the father of wealth’ (Kiker, 1971, p. 62). Indeed according to Kiker “human capital was somewhat prominent in economic thinking until Marshall discarded the notion as unrealistic” (Kiker, 1971, p. 51).

Early economists such as Say, von Thunen, Engel and Fisher, according to Polackeck (1995), were primarily concerned with the capitalized value of labor particularly as it applied to measuring national wealth and the resulting changes in national wealth caused by war (e.g., Giffen, 1880; Guyot, 1914; Boag, 1916) or immigration (e.g., Kapp, 1870). With an interest primarily to explain a country’s growth, initial research considered aggregate measures of human capital (Polachek (1995). Perhaps this is why Schultz (1961) developed exhaustive measures of US human capital stock. From these, he tried to quantify the portion of GNP growth unexplained by conventional models. While macroeconomic growth considerations can explain motives for public human capital investment, other patterns, such as repeated evidence that the most educated workers have the highest earnings led researchers to explore reasons why individuals devote their own resources to educational investments. Clearly, if education enhances personal earnings then private spending on education pays. Understanding such investments in education resulted in studies deriving methods to estimate private returns (Becker, 1975). Mincer (1958), in his quest to devise econometric techniques to estimate these returns, is probably the first to model human capital investment using capital theory’s mathematical tools. By showing that individuals invest up to the point where investment costs just equal the present value of schooling gains, he obtained a simple and tractable econometric specification leading to the now famous log-linear earnings

function. Not only did this formulation provide a measure of private rates of return to schooling, but it easily generalized to get at post-school on-the-job training, as well. Ben-Porath (1967) was the first to use human capital model to explore how an individual invests over his lifetime. Griliches (1963, 1964) was a pioneer when he tested whether schooling had any real effect on production output in farms. People of an organization constitute its core resource for continuing competitiveness (Rastogi 2000). Abouzeedan and Busler (2006) combined both the softer side of the concept, such as the cultural heritage, with the harder side of the terminology, such as education, work experience, and knowledge.

Financial capital and system

The early studies assumed that growth in the short run was largely driven by capital investment, while long-run growth was due to exogenous technological change (Corley et al 2002). Jorgenson and Griliches (1967) used neoclassical theory to focus on the measurement issues of tangible investment in order to reduce the size of the unexplained portion of growth due to exogenous changes rather than to explain its determinants. Later studies attempted to explain the determinants of growth by taking into consideration intangible investment, such as R&D that may influence technological change. (Corley et al 2002). Hall and Jones (1999) found that those factors of tangible and intangible can be institutional and relate to differences in social structure. Wolff (1996) in his study on convergence found that attempts to close this technological gap lead to differences in productivity. Neale (1984) argues that, productive knowledge is using things in an integrated system in which *no* person knows enough to accomplish anything worthwhile alone.

The system capital is an indicator of the level of support that individual firms receive from the different institutions both governmental and non-governmental (Abouzeedan and Busler 2006). The non-governmental institutions will be including: public establishments, private firms, unions, associations.. etc. The form of such support is varying in accordance with the structure and aims of such institutions (ibid). The

System Capital differs from the first two types, because it has both a macro and micro economical nature (ibid).

Open Capital, the Fourth Component of Innovation Capital

As we suggested earlier in this work, innovation richness of an economy requires a more open and interactive attitude (Abouzeedan et al 2009). In the traditional definition of Innovation Capital as proposed by Abouzeedan and Busler (2006), this component is absent. Such an aspect of innovation was introduced by Abouzeedan et al (2009) as a fourth component of the Innovation Capital, namely, *Open Capital*. Based on their definition of Open Capital, Abouzeedan et al (2009) deducted two projections. Firstly, Open Capital operates both at the micro as well as the macro levels of economy. In this way, it differs from the Human Capital and Financial Capital forms which are active at the micro level and from the System Capital which has its impact apparent at the macro level of economy. Secondly, Open Capital as a term should not be confused with the Open Capital concept known in the financial management literature. The new Innovation Capital with its four components is represented in Fig 1. Abouzeedan et al (2009) emphasized that the four components of Innovation Capital are in reality well-connected and they feed to each other enriching, in a total way the innovation activities.

Innovation capital and entrepreneurial character of economy

Abouzeedan and Busler (2006) theorized that when the components of the Innovation Capital are in balance, and contributing in equal proportion to the total input, that will lead to an environment with rich innovation activities leading to an entrepreneurial economy. In such economy the entrepreneurial activities are nourished and encouraged to flourish. The two authors argued that on the contrary of this situation is another scenario where the components of the Innovation Capital are not balanced. That occurs due to the expanding proportion of one of these components relative to the other two ones. Abouzeedan and Bulser (2006) argued that, such a condition will lead to poor innovation environment and thus to an economy which is non-entrepreneurial in its nature. That

scenario encompasses couple of situations. Such scenario is shown in Figure 2. When the Innovation Capital components are in non-balanced state, we would have a non-entrepreneurial economy. To clarify better the relationship between the three components of Innovation Capital, and the possible outcomes out of these relationships Abouzeedan and Bulser (2006) invented the Innovation Balance Matrix (IBAM). The Innovation Balance Matrix is an analytical tool to look at different situations regarding the state of the components of the Innovation Capital.

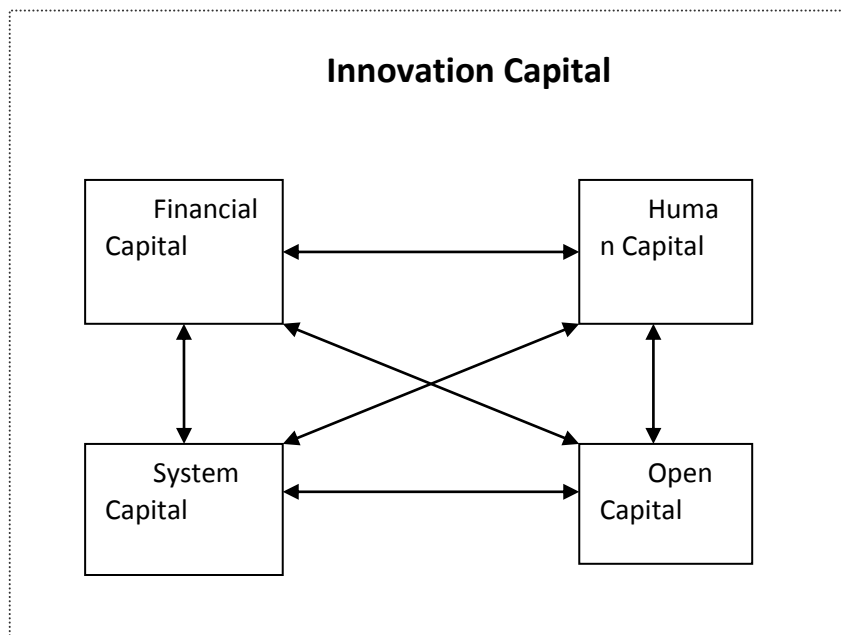


Fig. 1: Components of the Innovation Capital including the Open Capital

The culture and environment is crucial to tolerance of failure. However, the ability to tolerate failure depends on the culture. For example, in USA failure is viewed as a learning experience and people can benefit from failure, can learn from their experience and can go on to form successful companies as a result. In Britain the culture is less tolerant of failure and too often highly talented individuals have not been able to recover from failure (Deakins 1999). Although measuring entrepreneurial capacity at the

individual level is a hard thing to do, some institutions and writers have attempted to develop tests of potential entrepreneurial ability or enterprise such as the General Enterprise Tendency (GET) used in Durham Business School (Cromie and O'Donoghue , 1992).

Open Innovation Management

IT and Open Organizational Structures

Information and Communication Technology (ICT) is causing the organizations to adapt an open structure, in contrast to the classical closed structure (see Scott, 2003).

According to Fink and Kazakoff (1997), the potential benefits that an organization can obtain when it utilizes ICT may be extensive and include efficiency gains, increased management effectiveness and improved business performance. IT developments are able to reduce transaction costs for firms and organizations. The falling costs of computer hardware, software and telecommunications and associated performance improvements have enabled organizations to re-examine the way they conduct business and come up with more cost-effective practices. This lead firms and organizations to be more open in running daily activities of including innovation ones. As pointed out by Fink and Kazakoff (1997), in the small business domain, IT systems would prove invaluable in tracking customer orders, correspondence, delivery and payments. According to Globerman et al (2001), Internet has dramatically reduced the transaction costs in respect to costs of “point to multipoint” communication, making it easier for brokers and other information providers to supply information to their customers. Allarakhia (2009) argued that the vertically integrated organizational structure facilitate innovation activities which are internally-focused while the new forms of organizational structures are more fluid and open, allowing for integration the internal and external sources of innovation. *Open Innovation Management* stresses openness and cooperation in the innovation activities. It demands the usage of an open business model. Researchers indicate that the new successful biotechnology start-ups, such as *Genentech*, *Amgen* and *Genzyme*, are using such a model rather than the older closed business model (Chesbrough, 2003). Lakhani

and von Hippel (2003) listed types of incentives which are driving the firm to use open source management.

IT and Open Innovation Management

Recently and due to escalating costs of R&D, the life science industry have started to seek collaboration with academic institutions to stimulate and enhance their innovation activities through what is described as an “open innovation system” (Melese et al., 2009). The term “open innovation” was proposed by Chesbrough (2003) to describe how useful knowledge and technology was becoming increasingly widespread when newly developed technologies and products are benefiting from the integration of knowledge and expertise from multiple sources. Using external knowledge relations more extensively as a complement to in-house research influences the way firms are organizing and manage its innovation activities (Teirlinck and Spithoven, 2008). The nature of the innovation has changed, from using linear models of innovation to adopting non-linear innovation models (Kline and Rosenberg, 1986).

The nature of the open innovation model facilitates for the firms to adapt their business model in favor of research and development (R&D) activities and technical change that take place outside the firm. As such, the innovation effort is distributed between various parties (von Hippel, 1988). Many notions and concepts were introduced to the innovation literature in relation to the rise of the spatial organization. Among such notions are; *innovative environments* (Aydalot, 1985), *clusters* (Porter, 1990), *innovative milieu* (Camagni, 1991), *regional innovation systems* (Cooke, 1992) and *learning regions* (Florida, 1995). Laven (2008) identified the three theories of innovation systems, clusters and triple helix as theories of innovation-producing arrangements. This is because these theories emphasize the interaction between organizations in innovation production. Open-source R&D is another approach to conduct research allowing scientists and academicians to join forces across organizations offering their competence freely in order to facilitate the solving of various common problems (Munos, 2006).

The emergence of the open innovation concept and its promotion as a new notion comes as a result of the increasing complexity of innovation processes as well as how

innovation management should cope with this complexity (Teirlinck and Spithoven, 2008). In open innovation, external knowledge relations are considered vital elements and being complementary to the internal research (Cohen and Levinthal, 1990; Veugelers, 1997; Chesbrough et al., 2006). Traditionally, business models tended to be closed systems. However, there are emerging concepts of how open business models do support open innovation (Chesbrough, 2006). The openness of innovation brings the issue of reaching to the most reliable decision by reducing the variability and risk in the decision-making process.

One way to achieve that is through involving more individuals in such decision-making processes. This is termed in new wording by James Surowiecki as “The Wisdom of Crowds” (Surowiecki, 2009). He stressed that the need to have four elements or key criteria to form a wise crowd and separate them from irrational subjects in the sample. These are: *Diversity of Opinion, Independence, Decentralization* and *Aggregation*. In a paper written by Abouzeedan (2005), the author has looked at the way the entrepreneurial environments in the western countries have developed in comparison to developing regions of the world such as the Arab countries. Abouzeedan (2005) used a new analysis tool, the “Entrepreneurial Re-Cycling Model” to understand the different path the two regions went through (Figure 1). He concluded that the economic policies of Arab countries have lead to suppression of the possibility for the small firms in the region to grow. The two important processes of “entrepreneurial empowerment” and “knowledge spill-over” were eliminated.

The “Entrepreneurial Remedy Model”

A question that has been discussed by Abouzeedan (2008) has to do with the way the developed countries have kept the entrepreneurial recycling processes running smoothly.

Abouzeedan (2008) answered this question by developing further the Entrepreneurial Recycling Model or EREC (Figure 2). According to the writer, although the entrepreneurial re-cycling processes in the western world were left intact, there were obvious and clear efforts to maintain it. Abouzeedan (2005, 2008) understanding of the type of effort given by developed countries to enhance and sustain the entrepreneurial

activities committed would help us remedy and cure the situation in the developing countries such as the Arab countries and in similar the economies. We argue in this paper part the same logic can be called upon when it comes to developing regions within a country. In the developed countries governmental and non-governmental organizations and institutions are pursuing policies of support for smaller firms (Abouzeedan, 2005). To understand how these supportive mechanisms are merging with the Entrepreneurial Re-cycling or EREC model, proposed by Abouzeedan (2005), we need to recall some basic definitions from Abouzeedan (2008). These are: entrepreneurial remedy feeding, entrepreneurial node, accumulation area (See Appendix (A)).

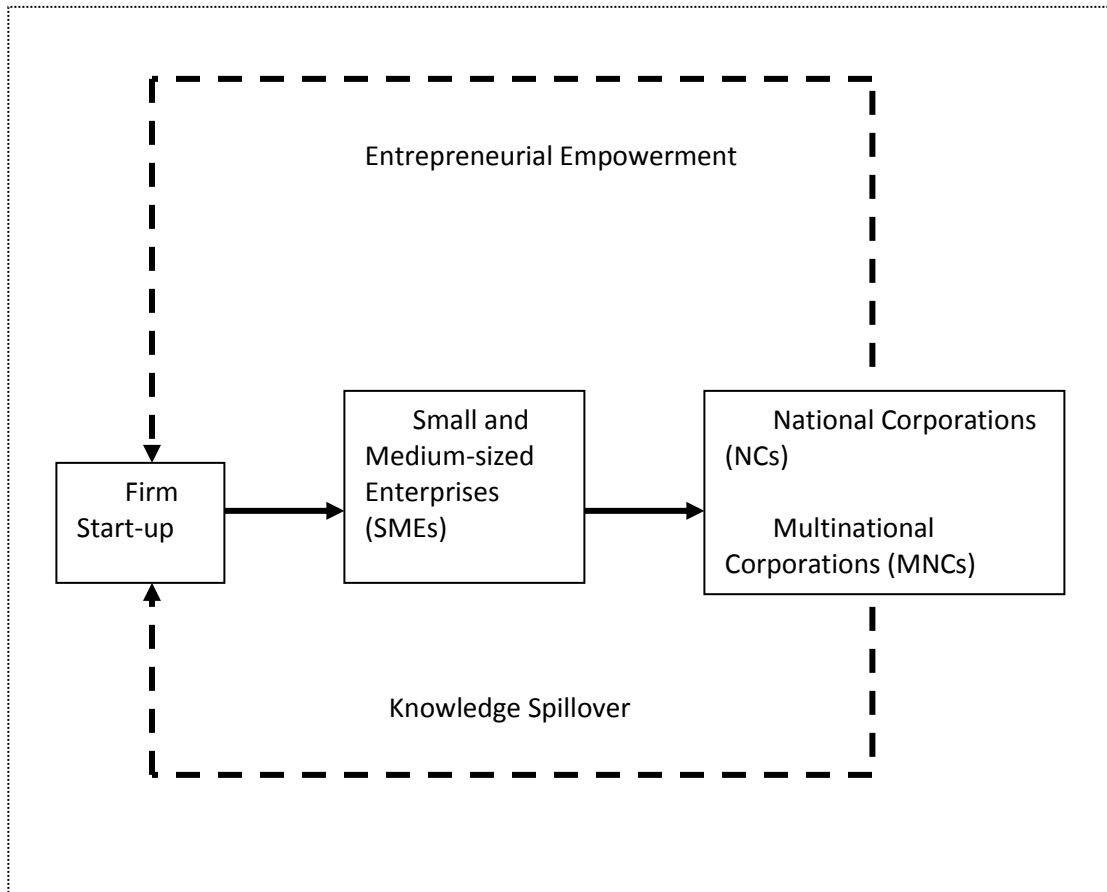
Entrepreneurial remedy feed presents the mechanism by which the innovation capital is enriched in the economy (Abouzeedan and Busler, 2006). Examining the Entrepreneurial Remedy Model map (as in Figure 2), we see that map has three nodes and two accumulation areas. There are actives actors in the three entrepreneurial nodes (see Appendix (b)). The first node attracts mostly private and often university-initiated constructions. Research institutions are also active in creating players belonging to this node. That said, this is not the case all of the time. In some countries, such as the Arab countries, they can be governmentally-supported initiatives. The actors and players in the First Entrepreneurial Node are subjected mainly to the impact of *Knowledge spill over*. Most of the actors and players belonging to the second entrepreneurial node are mainly the creation of the private sector. The players and actors of the Second Entrepreneurial Node are subjected mainly to the impact of *Entrepreneurial Empowerment* (Abouzeedan, 2008). There are no similar organizations, such as the US Small Business Administration (SBA neither NUTEK (Sweden) in the Arab countries or in most other developing regions of the world who have the same function. Governments are still playing a minor role in relation to the promotion of entrepreneurial activities of societies such regions (Abouzeedan, 2005, 2008). It is worth stressing that there have been recent surge in number of incubators if the GCC region, one of the major parts of the Arab world where there is a clear development potential (Al-Mubaraki and Busler, 2010, Al-Mubaraki et al, 2010). Actually, most active among these countries is playing an indirect role through the encouragement of private initiatives to take the lead. The problem with this approach is that these players mostly belong to the Second Entrepreneurial Node and thus lean to be

venture capitalists and rough investors. The Third Entrepreneurial Node is very essential to the efficiency of the entrepreneurial remedy strategies of the society. It is within this node where the coordination and planning of the macro-entrepreneurial policies of the economies take place. It is here where the economic policies of the Arab countries are lacking any real presence (ibid).

The proposed Entrepreneurial Remedy model has two “Accumulation Areas”. The first “Accumulation Area” receives the experiences and learned lessons gathered from the actors in the first node (Abouzeedan, 2008). The Second “Accumulation Area” absorbs the experiences and learned lessons that are gathered from the actors in the second node. Both of the two accumulation areas then feed into the Third Entrepreneurial Node. That is why we stressed the importance of this particular entrepreneurial node. The wealth of the entrepreneurial knowledge and the related know-how gained by the actors and players of the third Entrepreneurial Node is now directly fed to the start-ups. A portion of the experiences and learned lessons, as well as the supportive measures, are fed from the first and second entrepreneurial nodes directly to start-ups and entrepreneurial seeds (ibid).

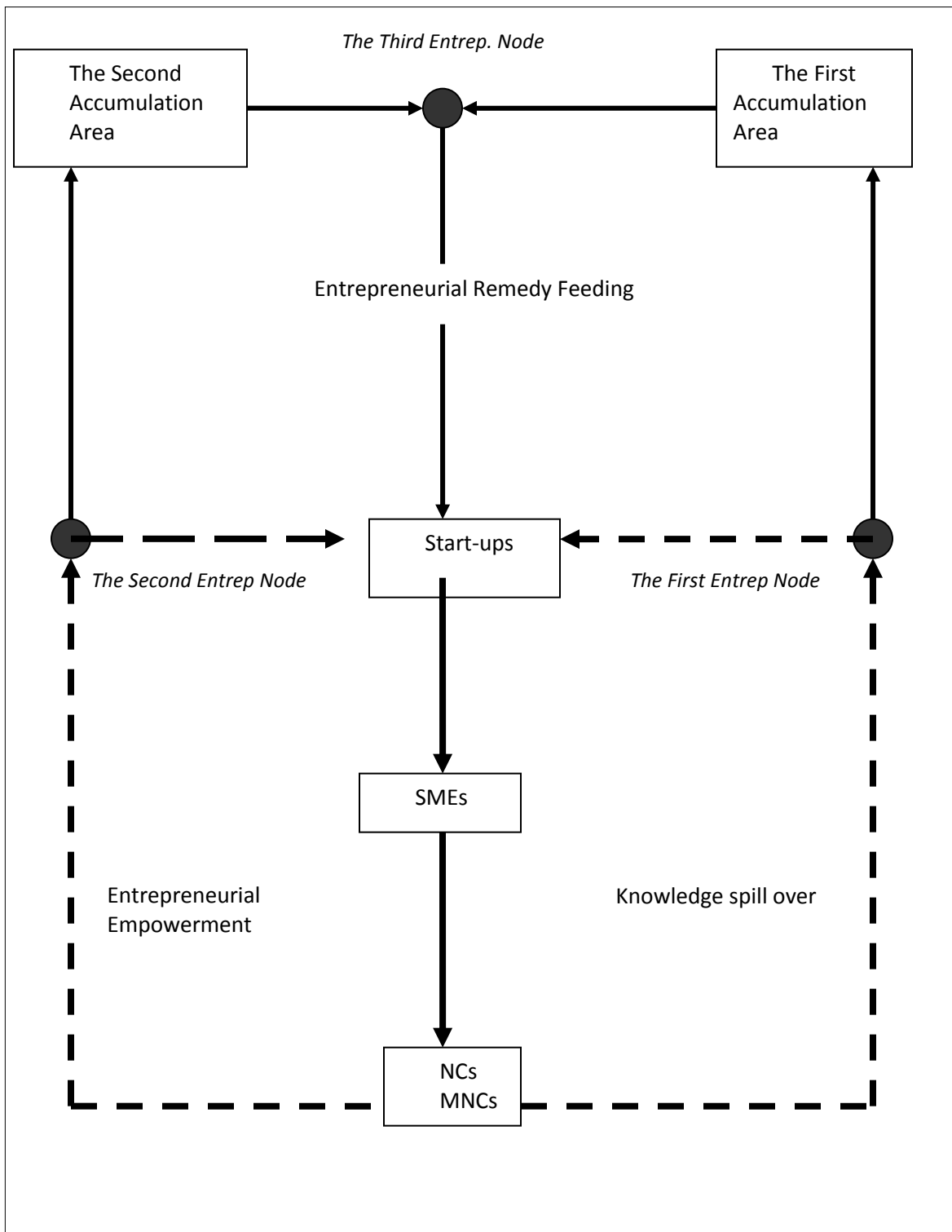
Abouzeedan (2008) argued that the lack of the remedy mechanism embedded in the entrepreneurial remedy model in the case of the Arab region, as an example of developing countries, is the cause for the predominance of the destruction and distortion to the entrepreneurial cycle. The developed countries have succeeded in curing and getting rid quickly, of any tendencies of destruction and distortion because they, unconsciously, followed the economic logic embedded in the Entrepreneurial Remedy Model. Economies of different societies develop diverse levels of entrepreneurial activities depending on the degree of availability of tangible as well as intangible resources and how they employ these resources in their innovation activities.

Figure 2 The Entrepreneurial Re-cycling Model



Source: Abouzeedan (2005)

Figure 3 The Entrepreneurial Remedy Model



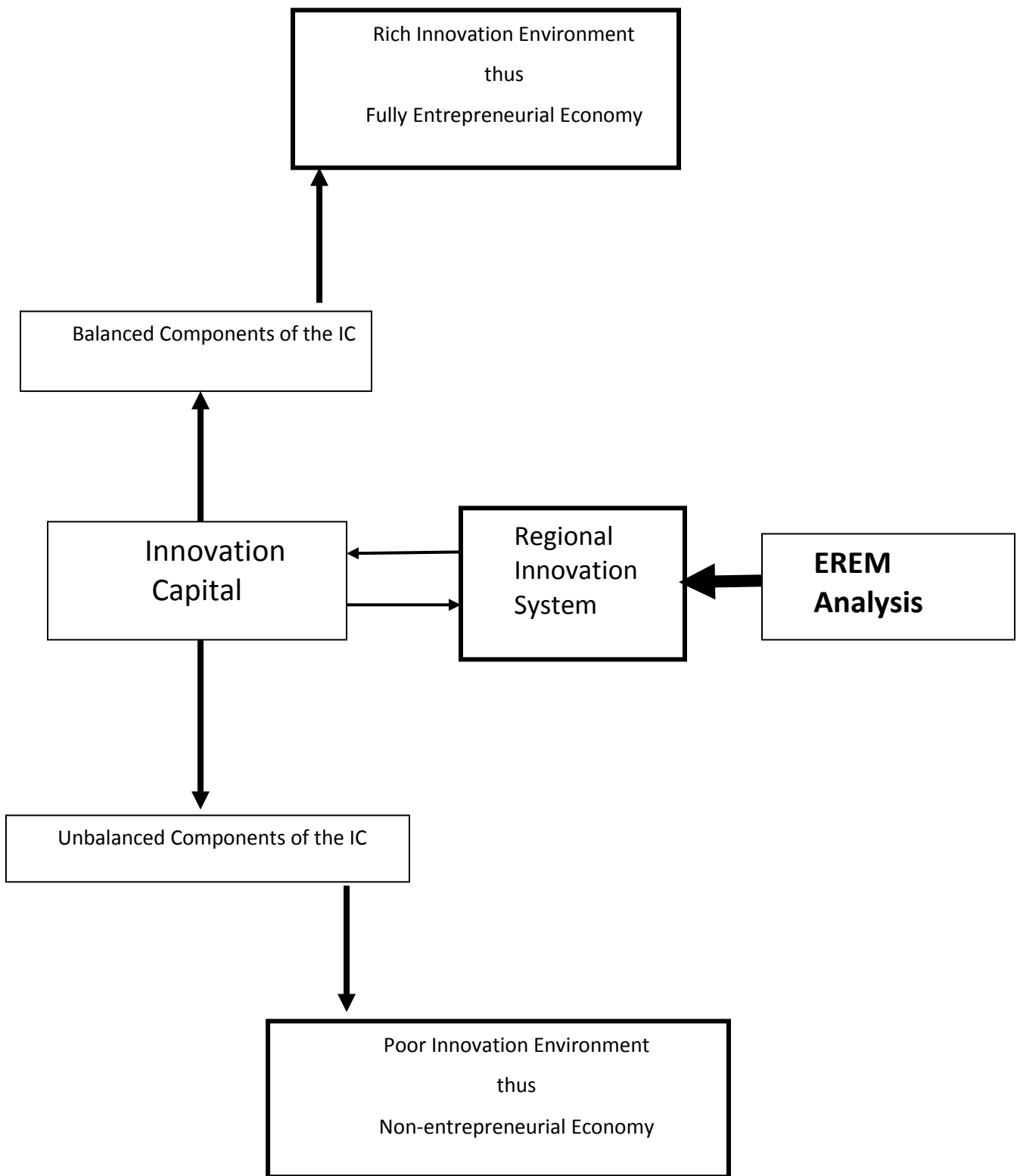
Source: Abouzeedan (2008)

Impact of innovation and the EREM tool

As we said before, Abouzeedan and Busler (2006) postulated that when we have the components of innovation capital in balance we have an entrepreneurial economy and when they are not in balance we have a non-entrepreneurial economy. In this paper, we are arguing that such situation can arise also at the regional level. Actually, the richness of the innovation capital at a national level can feed into the regional economy and visa versa. This argument can be extended by claiming that performance of the innovation system at the national level can feed into innovation systems at regional levels. As we said before, to understand the relationship between the entrepreneurial nature of a society and the entrepreneurial processes embedded in the remedy mechanisms, Abouzeedan (2008) introduced the EREM tool. If one uses the EREM tool at the regional level one can establish a parallel relationship between innovation activities and the entrepreneurial activities also at that level. As in the case of the analysis of EREM at the national level there are three distinct entrepreneurial nodes. The actors in these nodes are similar to the ones that are active at the national level (see appendix (B)). All the actors in the three nodes are also active at the regional level. Also, all the three processes which dominate the entrepreneurial cycle at the national level, namely entrepreneurial remedy feeding, entrepreneurial empowerment and knowledge spillover, are the same processes that encompass the entrepreneurial cycle at the regional level. Understanding these processes is very essential to grasp what happens when one tries to project the economic development of a region.

The way the EREM tool is connected to the innovation capital map is presented in figure (4). The regional innovation system bridges the two sides of the entrepreneurial framework.

Fig. 4: EREM analysis of the entrepreneurial economy



Conclusion

Economies of different societies develop diverse levels of entrepreneurial activities depending on the degree of availability of tangible as well as intangible resources and how they employ these resources in their innovation activities. In a previous work by Abouzeedan and Busler (2006), a new type of capital, i.e. Innovation Capital, has been suggested to serve as an indicator for the degree of richness of the entrepreneurial environment in an economy. However, the issue of accessibility and openness in the innovation process was not reflected the Innovation Capital concept as presented earlier. Innovation activities in the modern economies tend to be more interconnected and open in their nature and our understanding for the innovation process has to reflect on that. Abouzeedan et al (2009) incorporated a new component within the Innovation Capital, namely Open Capital to address this concern.

Abouzeedan (2005) looked at the way the entrepreneurial environment in the western countries has developed in comparison to the less developed regions of the world, such as the Arab countries. He defined a new analytical tool, the “Entrepreneurial Re-Cycling Model” to understand the different path the different regions went through in their economic development. Abouzeedan (2005) concluded that the economic policies of Arab countries have lead to suppression of the possibility for the small firms in the region to grow. The two important processes of “entrepreneurial empowerment” and “knowledge spillover” were eliminated.

Abouzeedan (2005) argued that in order to re-activates the entrepreneurial cycle, the responsible authorities in the region need to invest heavily in projects aiming at re-discovering the local skills and entrepreneurial storage of heritage and converting these into new micro enterprises or smaller firms. In a later paper Abouzeedan (2008) found that the developing countries had in place a remedy strategy to the keep the entrepreneurial cycle in tact. He proposed a model of analysis, EREM, to explain what kind of mechanisms and actors are involved in activating the remedy processes. In the original paper of Abouzeedan (2008), the EREM was used for an analysis at the national level. In the current paper, we used EREM to study the regional development situation.

The analysis in this paper was done to show how the innovation capital can be related to the analytical tool of EREM and how the regional innovation system functions as a bridging extension between the two analytical approaches.

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Appendix A

The EREM framework: Basics definitions

Terminology related to EREM	Definition
Entrepreneurial Remedy Feeding	<i>The processes by which policies practiced by governmental and non-governmental institutions of society promote, encourage, and propagate a healthy entrepreneurial environment in the society are initiated and maintained.</i>
Entrepreneurial Node	<i>An aggregate or group of actors or players taking a major entrepreneurial supportive role defined by its location in the topography of the Entrepreneurial Remedy Model map.</i>
Accumulation Area	<i>A conceptual sphere where the experiences and learned lessons from the actors and players at the specific node are gathered and stored and further processed.”</i>

Appendix (B)

Major players at each entrepreneurial nodes of the EREM framework

Entrepreneurial node,	Major active players
The first entrepreneurial node,	<i>Incubators, Technical Parks, and High-tech Concentrations.</i>
The second Entrepreneurial Node are:	<i>Commercial Centres, Business Complexes, Industrial Agglomerates, and Exhibitions Facilities.</i>
Third Entrepreneurial Node	The governmental and non-governmental institutions working with the issue of small business welfares and the entrepreneurial promotion of society such as the Small Business Administration (USA) and NUTEK (Sweden).