ENTREPRENEURSHIP AND ECONOMIC GROWTH: AN INNOVATION SYSTEM PERSPECTIVE

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ABSTRACT

Entrepreneurship can be considered as a learning path that enables people to turn ideas into defined project to be implemented. In the economic literature the consequences of entrepreneurship have been documented especially at the level of the region (e.g., Audretsch and Fritsch, 2002), that of the industry (e.g., Carree and Thurik, 1999) and that of the firm (e.g., Caves, 1998), even tough there are some studies that investigate the relationship even at the level of the economic growth in general (Carree and Thurik, 2003, 2006).

However, it is unclear whether there are some key variables belonging to the industrial and innovation structure of a country that may influence the achievement of a higher level of country entrepreneurship. As a matter of fact the concept of National System of Innovation (NSI) (e.g. Lundvall 1992; Nelson 1993) is particularly relevant in this context. Recently, as discussed by Radosevic (2007), the two concept of entrepreneurship and NSI may well be considered as intertwined, as the former is part of the many functions that should be performed by the latter in order to enhance the innovation capabilities of a country. In particular, each country may be the source of different opportunities to be exploited through entrepreneurial activities. With regard to this issue, the aim of the paper is that of discussing both from a theoretical and empirical point of view the role played by NSI both in developed and developing countries in fostering entrepreneurial activities.

Keywords: entrepreneurship, innovation system, growth
JEL classification: O31,O33,O43,O57

1. Introduction

The role of entrepreneurship inside the economic literature is considered to be particularly relevant across different field of economic analysis. As a matter of fact, the phenomenon has been analyzed under the lenses of the economic development, of the economic growth and even inside the literature of economics of innovation. It reflects that the role of entrepreneurship is multidimensional and that it potentially affects not only developed countries but also transition and developing countries.

However, each of this strand of literature has followed a different path to develop their argument. As a matter of fact, even though the mechanisms through which entrepreneurship may affect economic growth have been singled out the final effect is not clear. This is due to the fact that it is not taken into consideration the role played by the local context in fostering entrepreneurial opportunities. For this reason, we introduce the concept of National Innovation System (NSI) in order to understand what are the differences between countries in helping entrepreneurial forces to be displayed.

The paper is structured as follows: section 2 discusses the concept of entrepreneurship and its linkages with economic growth and the system of innovation literature. In the third section we focus especially on the NSI concept, explaining the way it may be helpful in giving some insights with regard to the possibilities that it influences the entrepreneurial opportunities while in the fourth section we take into account the issue related to the NSI quantification

Section 5 introduces the cluster analysis that is useful to understand what are the most important institutions that may foster entrepreneurial opportunities. Section 6 concludes.

2. Entrepreneurship and economic growth

The concept of entrepreneurship is particularly difficult to define. It is due to the fact that this word has been given several meanings. As many authors recognize, in economic literature the role of the entrepreneur is manifold. He can be considered alternatively as the person who bears the risk associated with a new economic activity or the person who provides financial resources to be invested in innovation or the innovator itself (for a complete list of functions see Hébert and Link, 1989). However, the most important contribution in this respect comes from the studies carried out by Schumpeter (1934): in particular he links the concept of entrepreneur to that of innovation distinguishing especially four roles: the person who has a new idea and that specifically invents a new product, the entrepreneur who brings it to the market, the capitalist, who provides financial resources for the innovation to occur and finally the manager who supervises the daily business of the new idea.

It is easy to see that according to these definitions all the different roles of entrepreneur points into the direction of an effect on economic growth. In particular, the mechanisms that links entrepreneurship to growth may be essentially four: knowledge spillovers, decentralization, experimentation, and competition.

Nevertheless, the association between entrepreneurship and economic growth is ambiguous because they have been found both positive (Acs and Muller, 2007; Bosma et al. 2006) as well as negative results (Muller et al. 2008). In the same way non significant results have been found (Audretsch and Fritsch, 2002). These conflicting results indicate that the role of entrepreneurship do not have a clear effect on economic growth because it may be mediated by forces that are inside the country that are needed to fully develop entrepreneurial opportunities. As a matter of fact., the mechanism explained above will be working properly only if a set of interacting institutions is present inside the country. In this respect, as considered at the beginning entrepreneurship is closely linked to the concept of innovation, and, in particular to the concept of systemic innovation. This bring us to consider the role of national innovation system (NSI) that is defined broadly as "all important economic, social, political, organizational and other factors that influence the development, diffusion and use of innovations" (Edquist, 1997). Up to now, the two notions of entrepreneurship and NSI have been considered as separately and very few efforts have been carried out to combine them. Only Radosevic (2007) through a critical survey of the literature on both NSI and entrepreneurship tries to combine them in a common framework using the NSI functional approach. In particular, he considers entrepreneurship as a systemic phenomenon that is driven by three different aspects: technological, market and institutional opportunities.

However, from my point of view, entrepreneurship has to be considered an outcome of the functioning of NSI rather than just a component or a function. As a matter of fact, NSI are very different in term of components and the way each of them contribute to the attainment of a higher level of international competitiveness of the country.

3. Methodological approach of National Innovation System

In this section I provide an introduction to the notion of NSI in order to understand what are the main component and also what may be the differences between the functioning of the developed and developing countries. In this way, it is possible to understand better in what way different countries may be the source of different enterprenurial activities.

First of all, NSI concept is a variant of a much larger family of "systems of innovation" approaches[1] that includes other specifications like, for example, the Sectorial Innovation System (Breschi and Malerba, 1997), the Regional Innovation System (Cooke, 1992) and the Technological System (Carlsson, 1995). However, in this paper, I focus explicitly on NSI because my aim is that of understanding the role played by country specific actors that may be crucial for the building of innovative capacities at the national level.

On the basis of the evolutionary and institutional foundations, NSI literature adopts a systemic approach towards innovative activities. In particular, the innovation process is not based on a sequential order of steps, but, rather, it is carried out by feedbacks and interactions between various actors. In this way, the research process which results in innovation is characterised by collaborative innovative efforts brought about by the science and the business sector.

According to this theoretical framework, three points are worth noting: in the first place, the role played by the institution endowment of a country is of extreme importance in the NSI approach. According to Edquist (2004), firms do no innovate alone but, rather, they are part of a complex environment where institutions and organizations shape and guide their innovative efforts. In the second place, the process of technological change is not considered as exogenous to the system but of endogenous nature (Edquist, 2004). As a matter of fact, the focus of the analysis is on dynamic instead of steady states. Finally, the analysis reserves particular attention to the development of the historic process because, as Balzat (2002) argues, historically grown structures of a system determine the current economic performance.

Another conceptual issue that should be underlined is that a lot of different definitions of NSI have been proposed (e.g. Freeman 1987, Lundvall 1992, Nelson 1993; Metcalfe, 1995). Although it is not possible to find out a unique general accepted definition, they have in common some features: firstly, these definitions are mainly used to define NSI in a developed context. As a matter of fact, the attention paid to institutions and organizations related more specifically to the R&D system is high. Secondly, coherently with the systemic approach used in the NSI literature, a central role is given to the web of interactions and linkages among the components of the framework involved in the improvement of technological performance. Finally, they are identified some basic aims (functions) of the NSI that are those relative to production, use and diffusion of innovations and new technologies.

[1] Edquist (2001) and Carlsson et al. (2002) discussing about methodological problems, argue that the main differences lay in the object and level of analysis.

These three points should be reconsidered in order to apply the concept of NSI to a developing context: first of all, for a developing country, the processes of technical change are of different nature with respect to developed economies. In particular, as pointed out by Edquist (2001), innovations in those contexts are characterised, most of all, by incremental innovations, product innovations, innovations in low and medium sectors and by all those types of innovations that allow the use of existing technologies at competitive levels of cost and quality. In the second place, in a developing context some institutions and organizations (such as R&D laboratories, or a proper education system) may be missing, inappropriate or ineffective. In the same way, flows between different components of the system may be absent as well. Thirdly, it is recognised that absorption and diffusion of innovations that are new to the firm is more important than the development of innovations that are new to the world. As a matter of fact, in the case of developing countries the need of inflows of technology from external sources is of vital importance if they want to attaint a certain degree of economic development. In particular, due to the process of globalization, NSI is now more subject to influences coming from the outside. As Niosi and Bellon (1996) argue, there are striking differences between countries in the rate and types of openness of their NSI. Usually, smaller countries are much more open, having high levels of flows of scientific and technological knowledge, while larger countries are more self-sufficient and thus less affected by international technological and scientific flows. In this respect, the study by Mowery and Oxley (1997) is of particular relevance in this respect because they discuss the contribution of NSI to inward technology transfer in the post war period. It is stressed that NSI, in the early stage of the process of technology transfer, operates mainly through the creation of learning capacities, such as a skilled production and technical labour workforce. Even Freeman (2002), talking about the possible emergence of a globalised NSI, concentrates his attention on explanation of the the catching up process of latecomer economies. He shows that the hypothesis of catching up put forward by Gersenkron (1952) needs to be complemented by the availability of an effective science and technology infrastructure. To sum up, developing countries need inflows of superior technologies coming from abroad, but, at the same time, they need to build their own technological capabilities if they want to take advantage of those flows.

4. A Framework for NSI

In this section, a broad framework for NSI will be presented. First of all, it should be noted that in the context of development, institutions are seen as actors that can retard or enhance economic growth even though a systemic focus on the micro and meta-level institutions that generate production and innovation is missing.

As I showed before, the particular notion of technological change suitable for developing countries involves the consideration of a broader set of sources of innovation. It means that innovation can not

be generated only by R&D institutions but also from learning coming from the ordinary economic activities. This broad approach can be a real valued added even for developed economies because in most of the pioneer and later contributions, other types of policies other than the innovation policies such as the education policies have been neglected. As a matter of fact, so far, the studies of NSI has given too little emphasis to the subsystem related to human resource development such as the education and training or the labour market. Moreover, in order to come up with development, some institutional support is needed such as infrastructure, production structure and financing institutions. Drawing from the framework by Oleyaran-Oyeyinka (2005), NSI is made up of 4 sets of institutions with the firm at the centre of the scheme:

- Political and Legal Structures
- Financial and Incentive Structures
- Science and Technological Knowledge Base
- Basic and High-Tech Infrastructure

In this study, I use this type of framework, because it sums up in a straightforward way the institutional and organizational actors that turned out to be significant according to the literature reviews of the previous sections.

Secondly, innovation is a process in which, especially in developing countries, the level of uncertainty is high and, for this reason, the issue of finance is crucial even though often financial institutions and financial resources are lacking; in particular, here, I consider the fact that MNEs may be attracted by some kind of financial incentive or by a positive business climate.

Finally, the science and technological knowledge bases represent the necessary commitment of the country towards R&D and education[2]. As a matter of fact, as Cohen and Levinthal (1990) argue, some commitment to R&D is needed both when the firm reach a certain stage of technological proficiency and when they have to absorb technology. If the country wants to gain international competitiveness then R&D labs are needed to conduct reverse engineering, to tailor technologies in order to fit the needs of specific customers, and more generally to comply with international industry trends. At the same time, from the review of the papers considered in the previous section a large endowment of high educated people and universities should be in place. As Nelson and Dahlman (1995) argue, one of the most pressing issue for the firm, especially in the process of technology adoption, is the need of a well educate workforce and a well developed educational system that lay the foundations to develop an indigenous technological strategy. In particular, the link between universities and firms is important for

[2] This component is usually identified with the "narrow" version of the NSI concept.

the fact that it can create qualified personnel that may help firms in building and upgrading their technological capabilities.

5. Quantification of NSI

One of the major weaknesses that can be found in the NSI literature, is the lack of quantification of this concept. Up to now, the analysis have been put forward mainly from a qualitative and descriptive point of view. However, it should be kept in mind that there may be some shortcomings in the empirical treatment of NSI. Some of them are analysed by Balzat (2002) who considers the fact that the set of indicators used is not so large and most of them used are usually related only to the "narrow" version of NSI. Usually, formalized cross-country comparison are reduced to a benchmarking exercise by concentrating the attention on a single indicator. Of course, this approach is too weak because it does not address some causal relationships between NSI and other external economic phenomena. In this regard, this paper represents an attempt to go further in the quantification of NSI by using the variables available in the KAM database from the World Bank[3].

5.1 Data analysis

According to the framework of NSI I described in the previous section, two types of analyses will be performed: a cluster analysis and a regression analysis. The former is carried out in two stages: in the first one, I used 20 variables taken all together (those with the least number of missing data) to understand if there are regular patterns in the way countries form homogeneous groups. In the second one, I run 4 cluster analysis considering in each of them the variables grouped on the base of the NSI framework identified before. The aim of this analysis is that of uncovering groups of countries that have similar characteristics in term of NSI variables and that of investigating whether the level of economic development of a country matches with the level of development of its NSI. This analysis is also useful in order to make some hypotheses with regard to the possibility that some components of the NSI could be more significant for some countries. All together I use 34 variables for 49 countries. All variables normally refers to years from 2000 to 2004, even though there are a few exceptions with variables that refer to the year 2005 and 2006.

This empirical application is based on the dataset of the World Bank for the Knowledge Assessment Methodology (KAM); this dataset is made up of variables coming from the World Bank's internal database Development Data Platform (DDP) and others data coming from various sources (the most important are the OECD national accounts data, Human Development Report, UNCTAD, UNESCO and the Global Competitiveness Report). It includes 81 variables and 132 countries from

[3] The database and the variables description are available online at the website: www.worldbank.org

which I have selected 38 variables that can be grouped around the four broad sets of institutions considered above and 49 countries of three different geographical areas: South America, Sub-Saharan Africa and South East Asia, some OECD countries and transition countries[4].
One of the limitations of the empirical application is that not all variables are available for time series so comparison between different period of time is not possible. Another limitation of the study is relative to some missing variables that especially for developing economies can cause some bias in the results.

5.1.1. Cluster analysis

In this part, I present the results of two types of analysis that have been performed: the first is carried out through the use of the hierarchical clustering method where the final number of the desired cluster is not initially decided by the investigator but can be inferred using the coefficients of the agglomeration schedule[5]. In running the algorithms I have used four different linkage methods: furthest neighbour, within-linkage, between-linkage and Ward's methods. For each of these methods 3 different linkage distances are used: Euclidean distance, Squared distance and Block. In this way, 12 cluster algorithm have been performed. Due to the fact that different methodologies can lead to different results, by comparing several runs it is possible to understand whether the results of the cluster analysis are robust. Instead, in the second type of analysis, performed by using the variables grouped according to the NSI framework, the final number of clusters[6] has been set from the beginning. In this way, by using the final cluster centres it is possible to see whether the countries inside a cluster perform better than others in some variables. The aim of this analysis is that of finding out what are the components of the NSI that can be responsible for the shifting of some countries between different clusters in the previous analysis.

For each of the 12 runs, I found to be of particular relevance three level of analysis. Looking at the agglomeration schedule and at the dendogram[7], in most of the 12 runs, the largest coefficients drops were at the cluster 2, 6, and 8.

- **Cluster analysis – first level**

In all of the 12 runs, two big clusters emerge. In particular, in 11 runs, the two groups show a high degree of cohesion meaning that, especially for developing countries (cluster 2), a big effort in term of all variables is need in order to jump the gap that separates the two clusters. From this first picture, it is

[4] The variables used are listed in the Appendix
[5]In the agglomeration schedule it is possible to find out informations about the evolution of the proximity coefficient along the successive steps of the cluster analysis.
[6] This method is the so called k-mean algorithm
[7] The dendogram is a tree diagram that shows the sequences of mergers of cases into clusters and from a certain step on, between already existing cases

possible to see that together with the OECD and transition countries the majority of developing counties that are in the cluster of the developed economies are from South America and Asia. There are however some exceptions: China and Argentina are sometime shifting from the cluster of the developed to that of developing countries. It means that there some dimension in their NSI that are not so well developed like those of all the other countries. On the other side, Tanzania moves only twice in the opposite direction meaning that this country, with regard to some variables is trying to fill the gap with developed countries.

Tab.1: Cluster Analysis – first level (Furthest Neighbour; Squared Euclidean Distance)

CLUSTER 1	**CLUSTER 2**
DEVELOPED NSI Argentina, Uruguay, Brazil, Chile, Colombia, China, Malaysia, India, Hong-Kong, Thailand, Botswana, Ghana, US, UK, France, Belgium, Netherlands, Ireland, Italy, Portugal, Spain, Japan, Mexico, Germany, Czech Republic, Poland, Hungary, Slovenia, Slovak Republic, Bulgaria, Romania	**DEVELOPING NSI** Venezuela, Bolivia, Paraguay, Peru, Bangladesh, Pakistan, Vietnam, Tanzania, Uganda, Kenya, Zimbabwe, Nigeria, Cameroon
NON PERMAMENT MEMBERS: China, Argentina	**NON PERMANENT MEMBERS**: Tanzania

A particular situation happens in 1 case, that is when the linkage distance used is the Block and the linkage measurement is the Furthest Neighbour. Here, the division between developing and developed countries is clearer. The developed countries (except for Mexico) are blocked together with some transition countries except for Bulgaria and Romania and only three developing countries remains in this group: they are Chile, China, Malaysia and Hong-Kong. It is a proof of the fact that the NSI of these countries may have several features in common with developed economies.

Tab.2: Cluster Analysis – first level (Furthest Neighbour; Block Distance)

CLUSTER 1	CLUSTER 2
DEVELOPING NSI Venezuela, Bolivia, Paraguay, Peru, Bangladesh, Pakistan, Vietnam, Tanzania, Uganda, Kenya, Zimbabwe, Botswana, Ghana, Nigeria, Cameroon, Mexico, Bulgaria, Romania, Thailand, India, Argentina, Uruguay, Brazil, Colombia	**DEVELOPED NSI** Chile, China, Malaysia, Hong-Kong, US, UK, France, Belgium, Netherlands, Ireland, Italy, Portugal, Spain, Japan, Germany, Czech Republic, Poland, Hungary, Slovenia, Slovak Republic

- **Cluster analysis – second level**

Moving to the case of 6 cluster partition a clearer picture emerges because the cluster of the developed countries is divided into several different groups:

Tab.3: Cluster Analysis – second level (Furthest Neighbour; Squared Euclidean Distance)

<table>
<tr><td colspan="5">CLUSTER 1</td><td>CLUSTER 2</td></tr>
<tr><td colspan="5">Argentina, Uruguay, Brazil, Chile, Colombia, China, Malaysia, India, Hong-Kong, Thailand, Botswana, Ghana, US, UK, France, Belgium, Netherlands, Ireland, Italy, Portugal, Spain, Japan, Mexico, Germany, Czech Republic, Poland, Hungary, Slovenia, Slovak Republic, Bulgaria, Romania</td><td>Venezuela, Bolivia, Paraguay, Peru, Bangladesh, Pakistan, Vietnam, Tanzania, Uganda, Kenya, Zimbabwe, Nigeria, Cameroon</td></tr>
<tr><td>CLUSTER 1</td><td>CLUSTER 3</td><td>CLUSTER 4</td><td>CLUSTER 5</td><td>CLUSTER 6</td><td rowspan="3"></td></tr>
<tr><td>Argentina, Uruguay, Brazil,Colombia, Botswana, Ghana,Portugal, Spain, Mexico, Slovenia, Bulgaria, Romania</td><td>Chile, Malaysia Hong-Kong, Czech Republic, Poland, Slovak Republic</td><td>China, Ireland, Hungary</td><td>US, Belgium, Netherlands, Japan, Germany, India, Thailand</td><td>UK, France, Italy</td></tr>
<tr><td></td><td>Malaysia Hong-Kong, (5)</td><td>China (2) Ireland (5) Hungary (1)</td><td>Thailand (1), more often India (1)</td><td>Italy (1)</td></tr>
<tr><td colspan="5">One case: Hungary not attracted towards any cluster</td><td>Tanzania (1)</td></tr>
</table>

In this case, in all but one run there is a stable group of developing countries (cluster 2) where Tanzania is included even though it is sometimes shifting. Of particular significance is cluster 1 that is formed by some developed countries together with a group of emerging countries such as Brazil, Argentina, India, Thailand and others. With regard to the African countries only two of them are inside this group (Botswana and Ghana) even though they are sometimes shifting as towards cluster 2. However, India and Thailand are more often than other countries grouped with cluster 5 (with high developed economies such as US and Japan).

Inside the developed group, two cases are the most interesting: the Netherlands are sometime not attracted towards any cluster while in the remaining cases they are inside the cluster of UK, Italy and France or inside that of Belgium, Japan and US. A similar behaviour is shown by Ireland that in several cases forms a cluster with China. Only once is attracted toward the cluster of US. These two results are important for the fact that these two countries in last few years attracted large amount of FDI. It implies the fact that the type of FDI attracted by the NSI of China are of different nature from the

FDI attracted by the NSI of Ireland. In the first case they have been attracted more for market-seeking motivations while, in the second case, they have been attracted more due to fiscal incentives and better possibilities to find out a large skill base of workers. Another confirmed pattern refers to the fact that developing countries attracted towards the cluster of the developed countries are always : Hong-Kong , Malaysia, Chile (even though these two countries not always in cluster 5)

- **Cluster analysis – third level**

Tab.4: Cluster Analysis – third level (Furthest Neighbour; Squared Euclidean Distance)

<table>
<tr><td colspan="5">CLUSTER 1</td><td>CLUSTER 2</td></tr>
<tr><td colspan="5">Argentina, Uruguay, Brazil, Chile, Colombia, China, Malaysia, India, Hong-Kong, Thailand, Botswana, Ghana, US, UK, France, Belgium, Netherlands, Ireland, Italy, Portugal, Spain, Japan, Mexico, Germany, Czech Republic, Poland, Hungary, Slovenia, Slovak Republic, Bulgaria, Romania</td><td>Venezuela, Bolivia, Paraguay, Peru, Bangladesh, Pakistan, Vietnam, Tanzania, Uganda, Kenya, Zimbabwe, Nigeria, Cameroon</td></tr>
<tr><td>CLUSTER 1</td><td>CLUSTER 3</td><td>CLUSTER 4</td><td>CLUSTER 5</td><td>CLUSTER 6</td><td rowspan="4"></td></tr>
<tr><td>Argentina, Uruguay, Brazil,Colombia, Botswana, Ghana,Portugal, Spain, Mexico, Slovenia, Bulgaria, Romania</td><td>Chile, Malaysia Hong-Kong, Czech Republic, Poland, Slovak Republic</td><td>China, Ireland, Hungary</td><td>US, Belgium, Netherlands, Japan, Germany, India, Thailand</td><td>UK, France, Italy</td></tr>
<tr><td>CLUSTER 8</td><td></td><td></td><td>CLUSTER 7</td><td></td></tr>
<tr><td>Portugal, Spain, Slovenia</td><td></td><td></td><td>Netherlands</td><td></td></tr>
</table>

At this stage the group division is much more unstable across the 12 runs: for example, with reference to the stable group of developing countries (cluster 2), it is sometimes divided in two clusters underlining the fact that inside this cluster there are countries that at least for some variable perform better than other. Moreover, besides the cases of Chile and Hong-Kong and Malaysia, in some runs other countries are inside the clusters of developed economies: Argentina, Brazil and Uruguay. It is a proof of the fact that NSI of South American countries may perform in a similar way. The cases of China and India are important to consider because they are the countries that shift most between

different clusters (even though China more often towards the developing clusters and India more often towards the developed clusters); it reflects the fact that India may perform better in the R&D system than China.

In conclusion, from this cluster analysis I found out that the division between developed and developing countries is usually confirmed, meaning that there can be a certain matching between the level of economic development and the level of development of NSI even though, as I showed, there are some developing countries that are more shifting than others in this way pointing out that they perform better in some "dimensions" than others.

In this way it is possible to understand that there will be countries where the generation of entrepreneurial opportunities may be higher.

- **Cluster analysis – groups of variables**

In this case I run the cluster analysis considering the variables divided according to the 4 groups framework and using the K-means method by imposing a 6 level cluster solution (intermediate between the 2 and the 8 cluster partitioning). The aim of this analysis is try to uncover if there are groups of variables where some countries perform better and if the results of this analysis are in accordance with the previous findings. Moreover, it is a way to understand the variables that cause the shifting of countries between clusters.

Using the final cluster centre tables it is possible to make a rank and finding out what are the clusters that perform better than others . Several conclusions can be drawn.

In the first place, it is possible to clearly rank countries only with regard to the variables related to the political and legal structures and to the basic and high-tech infrastructures. Instead, with regard to the variables related to the scientific and technological knowledge bases there are some cluster that perform better in R&D variables but not in education variables. However, with regard to the most interesting case of shifting countries it should be noted that the motives of shifting for China are due to its poor performance relative to political and legal infrastructure, while as far as the variables of financial and incentive structures it is in the cluster with the highest ranking position. On the other hand, India, is in the same group of African countries with regard to the basic and high-tech infrastructure.

The most important thing is that there is group inside the developing countries that with regard to the variables related to science and technological knowledge base is inside one of the higher cluster. This group is formed by Brazil, Chile, China, India and Thailand. It means that even though they do better in this field they are not accompanied by the same good performance in other fields. Due to this fact, they are emerging economies not only for market reasons but also for the fact that they are upgrading they innovation capabilities.

Tab 5. Political and Legal Structures

CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6
US	Italy	Polonia	Mexico	Kenya	Zimbabwe
UK	Portugal	Bulgaria	Romania	Tanzania	Angola
France	Spain	Botswana	Ghana	Uganda	Nigeria
Belgium	Czeck	Uruguay	Thailand	Pakistan	Cameroon
NetherlandsJ	Republic		India	Peru	Bangladesh
apan	Hungary		Colombia	China	Ecuador
Germany	Slovenia		Brazil	Bolivia	Paraguay
Ireland	Slovak			Argentina	Venezuela
Hong-Kong	Republic			Vietnam	
Singapore	Malaysia				
	Chile				

Tab 6. Financial and incentive structures

CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6
US	Czeck	Poland	Argentina	Kenya	Tanzania
UK	Republic	Spain	Pakistan	Zimbabwe	Uganda
France	Slovak	Hungary	Romania	Vietnam	Ghana
Belgium	Republic	Slovenia		Botswana	Angola
NetherlandsJ	Chile	India		Peru	Nigeria
apan	China	Malaysia		Brazil	Cameroon
Germany	Italy			Uruguay	Bangladesh
Ireland					Ecuador
Portugal					Paraguay
Hong-Kong					Bolivia
Singapore					

Tab. 7. Science and Technological Knowledge Base

CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6

US	Portugal	Italy	Colombia	Botswana	Angola
UK	Spain	Bulgaria	Tanzania	Cameroon	Ecuador
France	Poland	Romania	Uganda	Bangladesh	Paraguay
Belgium	Hungary	Peru	Ghana		Bolivia
Netherlands	Slovenia	Uruguay	Kenya		
Japan	Slovak	Venezuela	Zimbabwe		
Germany	Republic	Argentina	Nigeria		
Singapore	Chile		Pakistan		
Hong-Kong	China		Vietnam		
Czeck	Thailand				
Republic	Brazil				
Malaysia	India				

Tab. 8. Basic and high tech infrastructure

CLUSTER 1	CLUSTER 2	CLUSTER 3	CLUSTER 4	CLUSTER 5	CLUSTER 6
US	Portugal	China	Ecuador	Peru	India
UK	Poland	Argentina	Paraguay	Vietnam	Bangladesh
France	Hungary	Venezuela	Botswana	Zimbabwe	Pakistan
Belgium	Slovack	Uruguay			Tanzania
Netherlands	Republic	Brazil			Uganda
Japan	Bulgaria	Colombia			Ghana
Germany	Romania	Mexico			Sierra Leone
Singapore	Malaysia				Kenya
Hong-Kong	Chile				Cote d'Ivore
Czeck					Angola
Republic					Nigeria
Slovenia					Cameroon
Italy					

6. Conclusions

The role of entrepreneurship in fostering economic growth has not bee clearly detected up to now, but only mixed results have been found. This is due to the fact the underlying dimensions of entrepreneurship have not been singled out. In particular, as argued by Radosevic (2007), entrepreneurship should be more clearly linked to the literature related to innovation system. This is due to the fact that innovation system may provide the framework in which entrepreneurial opportunities may be both created and exploited. For these reasons, by using cluster analysis I tried to understand the differences in innovation system in different countries around the world. From the cluster analysis I received the confirmation that the level of economic development is correlated with the performance gained in the variables related to the NSI. However, the main finding is that there is a group of emerging economies where the components relative to the "narrow" version of NSI (the R&D system) are getting similar to those of most developed countries. I found out that some developing countries mainly coming from South America and South East Asia are shifting between clusters due to the fact that they perform well in some particular variables that are more relative to a

NSI in a narrow sense. It means that those countries NSI may play a role with regard to entrepreneurship.

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