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Ferreira, João and Marques, Carla and Couto, Alcino and Alberto, Deolinda

University of Beira Interior and NECE, UTAD, University of Beira Interior, IPCB

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João J. Ferreira[1], Carla Susana Marques[2], Alcino Couto[3], Deolinda Alberto[4]

[1]*DGE and NECE-UBI Estrada do Sineiro, 1,Covilhã, Portugal, jjmf@ubi.pt*

[2]*DESG-UTAD, Av. Almeida de Lucena, 1,Vila Real, Portugal, smarques@utad.pt*

[3]*DGE-UBI, Estrada do Sineiro, 1,Covilhã, Portugal, acouto@ubi.pt*

[4]*ESA-IPCB, Quinta da Sra. de Mércules, Castelo Branco, Portugal, deolinda@esa.ipcb.pt*

This research aims to analyse the innovative performance of a Portuguese region (NUT III Beira Interior Sul) throughout the application of the Triple Helix (TH) approach, examining its capacity to describe and explain the innovative dynamics of the low density regions as engine of its competitiveness. The TH model seems to be a useful analytical tool to approach and organise public policy and actors' strategy oriented to shape and nurture emerging and fragile innovation systems, namely to identify and characterize regional actors and networks, its performance and links with national and international innovation support organisations and firms, the emerging interface institutions, institutional framework, as well as policy implications to embed the regional competitiveness within government-academia-industry partnerships.

Keywords:

Regional Competitiveness, Innovative Performance, Innovation System, Triple Helix approach.

1. Introduction

Over the past two decades the innovation systems approach has gained considerable attention amongst both academics and policy makers. In searching of explanations concerning the relationship between globalisation, economic growth, competitive advantage and technological innovation, the operationalisation of innovation system concept was extended to a variety of levels: global (e.g. [1], [2]), international (e.g. [3]), national (e.g. [4], [5], [6]), regional (e.g. [7], [8]), local (e.g. [9]) and sectoral (e.g. [10]). Each perspective emphasises the contribution of different critical elements of innovation process to competitive advantage and economic welfare.

A new approach of the innovation process was introduced by Triple Helix (TP) model which explores the relations between university/academia, industry and government institutions as a way of enhancing regional competitiveness (e.g. [11]). Based upon the contribution of the entrepreneurial cultural of the MIT and Stanford University to the economic success of Boston area and Silicon Valley, the model puts the university at the core of structural economic change. The TP model evolves according to the complex dynamics of trilateral relations between universities, innovative firms and government institutions driven by market and policies stimulus. The creation of hybrid organisations committed with entrepreneurial norms and engaged in closing the gap between invention and innovation, linking production

and use of knowledge, are the expression of the powerful engines that drive the knowledge economy and the current focus of many countries and regions to secure competitiveness and increase prosperity (e.g. [12], [13]).

Regions and local communities with weak structural conditions pose significant challenges to TP approach, namely the absence of oriented research universities, lack of economic competitiveness, human and social capital deficits, ageing and low population density and regional/ local governments with narrow competencies related with the innovation-based development policies.

This paper aims to contribute to a better understanding of the triple helix process at regional and local levels featured by economic and social contextual disadvantages. Based on a Portuguese case study, the paper describes the internal and external dynamics among triple helix partners, analyses critical issues and explores policy implications.

2. Triple Helix relations and regional innovation systems: frontiers and opportunities

The regional literature shows several examples of high-tech regions that have flourished around the local universities (e.g. [14], [15], [16], [17], [18], [19], [20]).

The literature identifies different knowledge transfer axes between academia and economy. The education and training function impact upon market labour (e.g. [21], [22]), the spin-offs from university research; (e.g. [23], [24], [25], [26]), the role of formal cooperation in R&D between academic and industry (e.g. [27]).

The TP model gives a strategic role to the university (e.g. [28]). Contrasting with Porter's "diamond" model of competitive advantage ([29]) and national innovation system ([30]), the university moves from periphery to the centre of economic dynamics.

The TP model is based on three institutional spheres: university, industry and government. Its functioning is characterised by decentralised and interdisciplinary dynamics, self-organisation and co-evolution. The development of interactions between the three institutional spheres and the internal dynamics of each one is fundamental to generate a virtuous process of economic growth and development. Thus, a greater emphasis should be given to quality of the institutional set-up, contextual conditions, learning processes and to the strategic behaviour of the actors, namely the role of the university and public policy in the task of translation knowledge and technology into economic value ([31], [32]).

According to Varga ([33]) the university knowledge transfers are strongly affected by territorial agglomeration of economic activities. The territorial agglomeration effects are recognised by Florida et al. ([34]). They state that the university's role in economic development is beyond production of inventions and commercialisation of its research. Its fundamental contribution is rested on generation of technology, talent and tolerance which feasibility is stimulated by urban agglomerations.

New insights are introduced by Saxenian ([35]). She argues that the concepts of agglomeration and external economies cannot explain why high level of concentration activities produces a self-reinforcing innovative dynamic. According this author, spatial proximity reveals little about the local ability to respond to the fast changing that characterise international competition. The agglomeration centred perspective tends to overlook the complex of institutional and social relationships.

The controversy suggests an earlier question. Can any university at any location foster a knowledge economy and society?

A step forward is given by Gaffard et al ([36]). According to the authors the problem should be framed on taking an ex ante view about how increasing returns or external economies are achieved. The analysis must not be only centred in the process of allocation resources, but fundamentally in the creation resources. Regional performance seems to be related with the

internal consistency of the clustering process and the ability to take advantage of external relations.

Another avenue is opened by Fourth Helix Model ([37], [38]). The authors sustain that the TP analysis must take into account not only enterprises and private markets, but also the public sector and civil society.

From theoretical point of view, these perspectives offer a landscape of opportunities favourable to the emergence and organisation of knowledge intensive process phenomena at lower levels of spatial aggregation.

3. Research Methodology

In this research, the adoption of a qualitative methodology was based on the empirical model. Although the TP model can be generalised, the results are specific to the region under study. In this context, the research takes the form of a case study ([39]).

This research focuses on the unit of analysis NTU III South Beira Interior (Portugal) comprising four counties: Castelo Branco, Idanha-a-Nova, Penamacor and Vila Velha de Ródão. Given the specific aspects of this empirical research we chose to use three different methods of data collection: bibliographic research and documents, semi-structured interviews and observation The interviews were centred on the actors with actual physical presence in the region and which present a regional based strategy; thus public institutions of national character were excluded.

4. Applying the Triple Helix to NTU III – South Beira Interior

The NTU III South Beira Interior has a land area of 3748.3 km^2 and a resident population of 73,923 inhabitants. The population density in 2007 was 19.7 inhabitants per km^2 ([40], [41]). It is a region in demographic decline with high levels of dependency and ageing and largely homogeneous in primary factors of competitiveness, particularly with regard to population, accessibility, production support infrastructures such as energy infrastructures and telecommunications. The county of Castelo Branco (and essentially the city) emerges as the natural hub of development.

After conducting a survey of entities present in South Beira Interior it was possible to draw a representation of the regional Triple Helix (Figure 1).

The analysis of the proposed model shows that the individual spheres present a higher number of elements than the jointed spheres; this fact shows the current weakness of the interface structures and the need to strengthen the network of partnerships between regional actors.

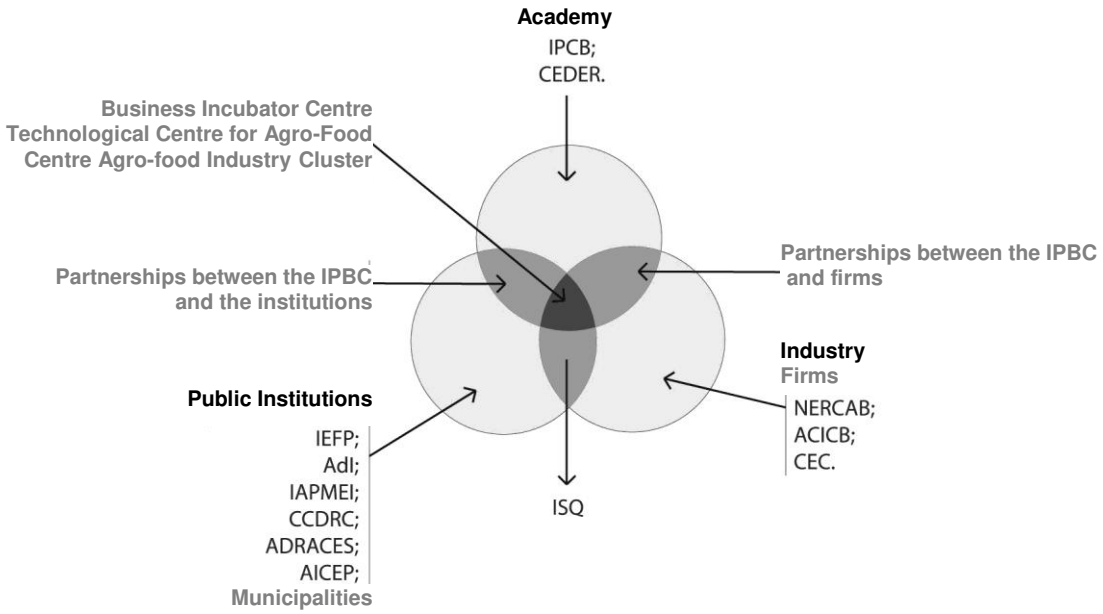

Figure 1 Triple Helix of Beira Interior Sul

5. Evaluation of the Potential of Triple Helix as a Regional Innovation System

A regional innovation system (RIS) analysis must be made considering two types of complementary factors: first, the activities that support the functioning of regional innovation system, including the characterization of actors involved in these activities and secondly, the level of involvement in socio-economic regions ([42]). For the first type of factors, that is, the subsystem for the creation and dissemination of knowledge, six activities to support regional innovation system are taken into account: basic and applied research, technology transfer, management and support to innovation, financing of innovation, education and training and regional economic development.

These activities have an impact on three levels – individual firms, firm's networks and regional economy - which represent different degrees of involvement. The combination of these two dimensions is shown in Figure 2, where each side of the hexagon is a support innovation activity and the concentric circles represent the degrees of involvement: the innermost refers to the firm level, the middle one refers to the firm network level and the outer circle corresponds to the level of the regional economy.

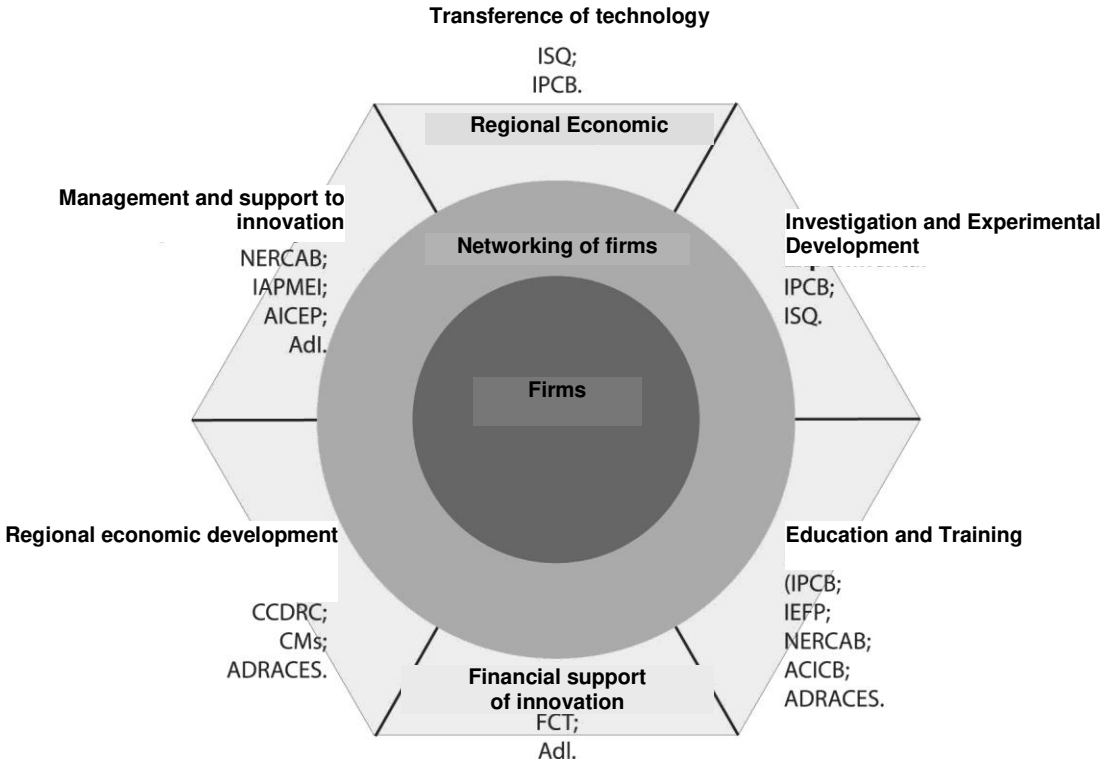

Figure 2 RIS of Beira Interior Sul

Regarding Education and Training it is noticed that the region has a strong capacity for this activity. As strengths we highlight the presence of the Polytechnic Institute of Castelo Branco, which is an higher education institution (HEI) deeply rooted in the region and the existence of a provision of vocational training geared to the needs of regional firms. The education and training activity is reflected at the three involvement levels early refereed.

In what concerns regional economic development the region relies on the presence of several public institutions that implement national government policies. The role of the municipalities should be highlighted due to the financial effort made on the attraction of foreign investments. The results of this activity benefit the entire region, that is, once again, we will find an impact on the considered three levels of involvement.

Considering management and innovation support activities, the entities that provide this service have no physical presence in the region and thus this activity is borne by business associations which act as priming agents of the regional economy.

Financing innovation is exclusively undertaken by the national government. There is no kind of positive discrimination for low density regions so these regions have to compete with other best-equipped both in terms of technological infrastructure and in terms of human capital.

The lack of both private research and experimental development or a center of science and technology is a structural weakness that must be overcome.

The application of the TP model of the Beira Interior Sul, helped to identify the most representative institutions in each sphere, as well as the interface institutions that have already been established. The running activities and projects that are being completed allow inferring about the beneficial impact of TP in the regional economy and regarding it as the embryo of a RIS.

6. Final Considerations

This study argues that the creation and dissemination of knowledge are located activities and depend on individual local actors and on its capacity to create hybrid institutions able to enhance new synergies between them.

As examples of hybrid or interface structures, we find the business incubator of Idanha-a-Nova, the office of technology transfer and the Cluster Agro-Food of the Centre.

In the region under study, the role of innovation organizer is assumed by the Polytechnic Institute of Castelo Branco. This means that academia is the driven force for regional innovative performance, though this performance is hampered by financial reasons lack of human resources.

With regard to endogenous factors that promote innovation and competitive performance we emphasize (i) - the presence of a university deeply rooted in the region and the existence of a provision of vocational training, targeting the real needs of regional firms, which translates into a strong capacity-wide training of senior technicians and professionals; (ii) - the activities undertaken by municipalities (iii) - setting up an interface entity, such as the Technology Agro-Food Centre will density the research infrastructure and the technological transference (iv) –the creation of the Technology Centre for Agro-food is consistent with the regional productive system, in which the agro-food industries take a position in the world of transforming industries; (v) - natural conditions that support the diversification of food products and thus creating added value; vi) creation of support structures for entrepreneurship such as the business incubator of Idanha-a-Nova; (vii) - the existence of institutions providing support services to private firms; (viii) - emergence of a logic of interaction between actors aiming the use of indigenous resources, stimulation of the economy and increase of regional competitiveness.

The existing activities and projects that are being completed allow the inferring about the positive impact of Triple Helix in regional competitiveness. However the different players that form the model do not yet constitute a regional innovation system; there are several factors contributing to this fact: (i) - lack of policies for regional innovation, science and technology (ii) - very thin control and influence over strategic infrastructure, (iii) – a very limited regional financial capacity; (iv) – lack of private research entities and of experimental development from laboratories and other public research facilities; (v) - low degree of openness to the outside, (vi) - underdeveloped network dynamics, particularly with regard to networks, vertical and horizontal, between companies, (vii) - the supremacy of the logic of competition over the logic of cooperation.

As contribution of this research we can refer that despite the many studies published on the subject, the majority is of a conceptual nature, with little empirical applications. Being a relatively new and still little empirically studied subject, it opens a wide range of possibilities for future investigations: we suggest the continuity of the study in order to verify the dynamic evolution of the TP and paths of consolidation of regional networks and the application of this model to contiguous territorial units in order to identify the opportunities for cooperation and complementarities between the players aiming the enhance of a broader RIS.

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