Cooperation and relationship in the triple helix model of innovation

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Abstract: During the last decades the cooperation between universities, companies and government has helped generate new knowledge, transfer technology and create incubators of small and medium enterprises (SME), and spin-offs. The triple helix model, which is the focus of this research, represents a paradigm for the university within this three-way relationship, with the development of the entrepreneurial university concept. In fact, business-minded universities have grown significantly in socio-economic terms, with the development and registering of patents, as well as in activities related to spin-offs. Spin-off companies created from universities help transfer knowledge and scientific research to the business sector, and facilitate communication between universities, the market and society. In recent years, technological change and cooperation between business and universities have become increasingly important. Competition in business, and the need for companies to collaborate more closely, is reshaping universities in terms of the research they undertake and their relationship with the state.

Keywords: innovation; enterprise; entrepreneurial university; government; triple helix model; relationship; cooperation.


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1 Introduction

The interaction and cooperation between universities, companies and government are very important elements for the long-term development of a country. This kind of relationship has helped not only to generate new knowledge and to transfer technology, but also to create incubators of small and medium enterprises (SME) and spin-offs.

When we speak about spin-offs, we refer to companies created out of another company or entity that already existed, largely on the initiative of an employee of the original company. In this sense, most spin-offs start from universities or public research centres. Thus, spin-offs that originate in universities become enterprises that capitalise their research, which makes them an interesting business proposition (López Jiménez et al., 2013).

Therefore, cooperation between universities and business is extremely important but more so if the state is involved. The interaction at the heart of this relationship revolves around the exchange of knowledge (López Jiménez et al., 2020a). The links forged in this relationship can positively affect a country’s development, generating a range of knowledge that can be widely applied and disseminated (Sposato, 2019).

As well as this cooperation and synergy between these three agents, companies themselves need to collaborate more closely. In effect, the argument for greater cooperation in the business sector is stronger than ever for companies wishing to achieve their objectives of developing and consolidating new products and/or services, rolling out new technologies and applying new knowledge, in other words activities related to research, development and innovation (R+D+I).
The aim of the triple helix model is to identify the institutional mechanisms and relations that enable this important transformation to take place. In this scenario, social change and productive relationships prosper if the state and industry link up with universities around knowledge-based economies (Etzkowitz, 2002), and this is an essential element in regional development (Etzkowitz and Leydesdorff, 2005).

The triple helix model at the centre of this research proposes a new paradigm for the university at a crucial time for its future development. This model embraces the entrepreneurial university concept, which has already seen business-minded universities grow significantly in socio-economic terms, with the development and registering of patents, as well as in activities related to spin-offs. Spin-off companies created from universities help to transfer knowledge and scientific research to the business sector, enabling research results to be applied directly to productive processes, and even their commercialisation. It also facilitates communication between universities, the market and society. These transformations have changed the way academics view business, in line with the growing necessity for collaboration that arise between universities and companies.

2 Theoretical background

In this paper we are going to analyse the relationship between universities, companies and the state, according to the model developed by Etzkowitz and Leydesdorff (Etzkowitz and Klofsten, 2005; Leydesdorff, 2003), which sees the university as an important creator of knowledge with a crucial role to play between business and the state. This model is an intellectual process that visualises the evolution of relations between university and society, and is marked by the intervention of the university in the economic and social processes.

The growth in literature on the triple helix has contributed to the evolution of these models, and thus the policies aimed at cohesively developing science, technology and industry (Giddens, 1984; Schmookler, 1966). The triple helix model is widely disseminated in developed nations as a medium for stimulating innovation and growth, and is viewed positively in emerging economies in Africa, Latin America and Asia.

This model encourages close connection between different disciplines and areas of knowledge. It also allows the university to play a strategic role and provides the basis for relationships with business. One of the aims of the triple helix is the search for a model that reflects the complexity of the concept of connection, by exploring the environment in which the relationship between the agents in question is to develop.

Etzkowitz and Leydesdorff refer to three different triple helix models: in the first, the state encompasses the academic world, and the company directs the relationship between these two; in the second, the institutional sphere of each agent is clearly defined and delimited; in the third, universities, the state or public sector and industry coalesce to generate an infrastructure of knowledge in which the institutional spheres overlap.

The debates around this subject have been extensive, and embrace issues such as how to reconcile the components of an investigation, namely the exogenous (curiosity and invention) and the endogenous mechanism (market-driven innovations), within the
academic research community (Schmookler, 1966). The model proposed by these authors refers to the evolution of the systems of innovation, and the conflict today centres on which path to take in terms of the relationship between the university and the company (MacLane, 1996).

The triple helix model has developed in three significant phases. In what we can call triple helix I, the nation-state encompasses the university and the company directs the relationship between the two. The extreme version of this model is the former Soviet Union and the Eastern Bloc. Milder versions also existed in Latin America and in some western countries. Triple helix I is a development model that is deemed to have failed. It was a top-down system that provided very little space for initiatives to flourish; innovation was stifled rather than allowed to develop. This phase can be seen in Figure 1.

**Figure 1** Triple helix I (see online version for colours)

In triple helix II, the institutional environments involved work within set boundaries, and the relationships between the spheres is clearly defined. Triple helix II amounted to a policy of laissez-faire, and was seen as an attempt to diminish the role exercised by the state in triple helix I. As we can see in the Figure 2, the kind of relationship established between the three kind of actors is completely different to the phase analysed before.

**Figure 2** Triple helix II (see online version for colours)

In triple helix III, a knowledge infrastructure is being forged in which institutional spheres overlap, with each agent adopting the role of the others, and where hybrid organisations emerge in different interfaces (Etzkowitz and Leydesdorff, 2005). The differences between the triple helix II and III have also been analysed from the legal perspective. This phase can be much better appreciated in Figure 3.
The triple helix is a useful model for promoting the spirit of enterprise as well as business growth, with its three helices of state, university and company. The functioning of the relationships within the triple helix is an essential element in innovation strategy both nationally and internationally.

One of the premises of the triple helix model is the transition to a knowledge society. In this respect, the university represents an institution with its origins in the Middle Ages as a bulwark of the feudal system, and which now moves within the industrial society. The term universitas previously defined students and professors as a guild endowed with a wide range of social privileges. In the beginning, universities were a type of professional school constituted by doctors, jurists and theologians, in no way tasked with universalising knowledge, despite its name. The first three universities, Salerno, Bologna and Paris, were originally schools of medicine, law and theology, respectively. The initial aim of these universities was to educate their students to be teachers and thus perpetuate the prominence of this guild (Godin and Gingras, 2000).

Returning to the central theme of this discussion, it is industry (the company) and government (state or public sector) that are the reference points of the post-industrial era of knowledge-based societies (Sposato et al., 2015).

In the analysis of the triple helix model, there are three elements that concur. Firstly, innovation is a fundamental aspect of the role played by universities, together with industry and government in the pursuit of a knowledge-based society. Secondly, there is more emphasis on closer collaborative relations between the institutional environments. Thus, the politics of innovation is increasingly the result of interaction rather than government impetus. And finally, while each institutional environment continues to perform its traditional or 19th century functions, it now also assumes the role of the others, operating in a new role as well as continuing to perform its traditional functions.

Our research clearly shows the emergence of the enterprise university taking up the traditional roles of industry. That said, one sector of the academic world might see this as a threat to the integrity of the university, undermining its position in society as an independent critic. Those against the vision of a more business-minded university closely linked to industry advocate a university that publishes its research findings and produces well-educated graduates.

Yet for the university to maintain its eminent role in generating knowledge, it must align teaching and research with the economic development of its host region. The university must adopt a culture whereby it willingly interacts with agents such as
companies and other organisations (Tanco and Camarero, 2013; Sposato and Jeffrey, 2020).

The model we analyse here can only function with the active participation of the state or public sector, to provide proper legislation, instruments and fiscal incentives for relations between universities and companies to thrive (MacLane, 1996). As reality clearly shows, the majority of states and regions nowadays aim to put into practice a model for development along the lines of triple helix III.

3 The importance of the knowledge society inside the triple helix model

The economic and social development of states is largely founded on the knowledge society, which is strongly conditioned by the relationship between universities, companies and the state, namely the three components of the triple helix. Based on this notion, societies can set a path towards the knowledge society or economy (Weingart, 1997).

At this point we need to define the term knowledge. This is a complex concept that some of the world’s greatest thinkers have grappled with throughout history without reaching a clear consensus on its definition. As far as this research is concerned, we can say that knowledge constitutes a type of organised, structured combination of ideas and information. Yet knowledge is clearly different from information in that it is superior in nature, being more complex and structured, possessing more dimensions than information, which is inert and static. However, because knowledge is connected to the individual, it also contains subjective elements.

Linked to this is the idea of knowledge management, which is the planning, organisation, coordination and control of those activities that lead to the capture, creation and dissemination of knowledge, in an efficient way, within the company or other type of organisation. The activities related to knowledge management will be, therefore, the generation of new knowledge, in other words, access to that invaluable knowledge from the outside world. However, if the knowledge possessed by an individual remains unshared with other members of the organisation, it becomes far less effective. So, one of the most important tasks in knowledge management is to facilitate interactions between members of the organisation.

One of the keys to social and economic progress in society is productivity. Workers are more productive if they work longer and more effectively, but they only become more productive and competitive if they reap the benefits of education and training in the job they are employed to do (López Jiménez and Dittmar, 2018); this is where universities, companies and the state working together can contribute.

We believe that universities could greatly facilitate the transfer of knowledge from their research to market by reducing red tape and becoming more business-minded. The knowledge transfer process would be more efficient if universities relinquished their desire to profit directly from the commercialisation of their research. Their research results could be offered freely, as for example in the case of the open source model developed in computing by Linux and its free software, which led to the emergence of Ubuntu and Kubuntu. This would bring new ideas to market more quickly and represent a return to society on the public investment made in universities. It would also have important social consequences in a globalised economy as companies seek to set up their
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R+D facilities in areas with easy access to qualified personnel and to the knowledge generated by universities and research centres.

It is important to highlight that in recent years we have seen considerable changes in technologies and closer ties between business and universities. In effect, greater competition and the need for businesses to forge alliances in order to grow, both in the market and with closer access to sources of innovation, is shaping the perception of universities in terms of research and development within states (Casanoves-Boix et al., 2020).

Innovation can only be successful if businesses are allowed to grow, such as in the case of niche markets, which in turn gives rise to new commercial groupings or transforms those already in existence. The assumption for continuous creation of high-level technologies and economic growth lies in the identification and location of the specific organisation (Domínguez-Escrig et al., 2020).

As a conclusion from what we have discussed so far, the triple helix model states that the university must play a more assertive role in innovation within knowledge-based economies. Thus, we can consider that the triple helix model shows that there are three important main processes that affect how knowledge is produced, exchanged and used.

The first process is related to the internal transformations occurring within institutions. For example, alliances and agreements that extend cooperation among businesses; universities opting for enterprise, alongside the traditional functions of education and research, with the creation of business incubators and spin-offs, etc. (Pineda-Albaladejo et al., 2017).

The second process comprehends transformations that occur mainly due to the reciprocal influences of institutions interacting with others. There are two paradigmatic examples, the UK and the USA. In the UK, since the days of the government of Margaret Thatcher, known as the iron lady, public financing of universities has been conditional on their contribution to the nation’s economic development. In the USA, the Bayh-Dole Act of 1980 allows universities to own the intellectual property arising from the results of their research financed by public funding.

Finally, the third process explains how the interactions among the agents give rise to the creation of all kind of networks. This interrelation results in new exchanges and projects, and such networks can drive organisational creativity and cohesion within a specific region (López Jiménez et al., 2020b).

4 Conclusions

If we consider different alternatives that exist in relation to the interaction and cooperation established between companies and governments, we can understand better how the link between universities and companies has now extended significantly across the USA and Europe, Asia and Latin America.

This link constitutes a valuable activity that involves the three agents, government, business and university, which aims to foment innovation and scientific development. In short, this connection is a dynamic and ever-changing process that represents a new paradigm for the three elements of the triple helix.
To conclude, we can state that the triple helix that represents the close connection between company, university and government is a valuable tool for examining the three-way relationship marked by social, historic and/or economic aspects. This model acts as an instrument for the analysis of the business, technical and educational context from various perspectives.

References


