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Creating entrepreneurial universities in an emerging economy: Evidence from Brazil

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ABSTRACT

The concept of the entrepreneurial university aims to promote the transfer of academic knowledge to companies and foster socio-economic development. The first wave occurred at pioneering universities in the United States like MIT and Stanford, defining a university-wide patent policy, establishing a technology transfer policy, setting up university-industry partnerships and churning out new companies. The second wave occurred in Western Europe, with ivory tower universities transforming themselves into entrepreneurial institutions supporting academic entrepreneurs. In terms of newly emerging economies making up the third wave, the promotion of academic entrepreneurship is high on their political agendas and, although the actual pioneering phase has already begun, it is not clear as yet which policies or structures are needed to foster the effective transfer of academic knowledge and the incubation of start-up firms, and eventually contribute to socio-economic development. In this sense, the aim of this study is to identify potential activities and effective policies to encourage the transfer of academic technology in Brazil, being one of the emerging economies. An analytical framework of the entrepreneurial university was constructed based on existing literature, consisting of five dimensions: entrepreneurial perspective, external links, access to university resources, innovation arrangement and scientific research. In an exploratory case study, eighteen interviews were carried out with incubatee-entrepreneurs and the managers of university business incubators in southern Brazil. Although all dimensions were mentioned in the interviews as being important in promoting entrepreneurship, the key finding from our research is that most academic start-ups are based on the entrepreneur's own technologies, rather than on the university's patents. The quality of entrepreneurial training, in addition to being in close contact with applied research, encourages academics to turn their business plans into start-up ventures. To conclude, although the new ventures are not based on academic patents, they are playing a proactive and dynamic role when it comes to socio-economic developments.

1. Introduction

The concept of the entrepreneurial university (Etzkowitz, 1983, 2004) has guided the strategic planning of most universities across the world. Universities that foster entrepreneurial activities are considered to be more efficient when it comes to commercializing scientific knowledge, mainly through patents and licenses, or through the development of business incubators and technology parks (Bramwell and Wolfe, 2008; O'Shea et al., 2007). Etzkowitz (2004) has called the ability of universities to develop entrepreneurial activities the second academic revolution. Nowadays, the commercialization of academic research results is seen as part of a university's role as innovator (Kuhlmann and Shapir, 2006). Beyond research and education, universities have become knowledge centers, working alongside with young and established companies and public and private research institutes in regional innovation networks to improve the commercialization of research results, fostering new business models, hereby bringing R&D to a higher level (Qiao and Yang, 2015).

From this perspective, the development of high-level academic research in connection to the concept of entrepreneurial university may be a shortcut to innovative results, with patentable scientific technology being commercialized through incubated spin-off and start-up firms, which in turn may become established firms in nearby technology parks and work together with university researchers. As a result, innovation can improve the existing technology pattern of a local industry, and thus foster social and technological developments at a local and regional level (Aaboen, 2009; Guerrero et al., 2015). By establishing business incubators and technology parks near university campuses,

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cooperative ties with start-up companies, established companies and academic laboratories are forged, while business transactions can be intensified, in addition to making it easier to approach customers, vendors and researchers through these business facilitators (Iansiti and Levien, 2004). Furthermore, as described by Etzkowitz et al. (2007), these systems can develop into innovation ecosystems when academic knowledge, talented staff and techno-economic dynamics interact through technology transfer offices, attracting financial investors and consultants, as well as legal support organizations to such an emerging cluster. As indicated by Etzkowitz et al. (2000, p.313): 'Entrepreneurial activities are undertaken with the objective of improving regional or national economic performance as well as the university's financial advantage and that of its faculty.'

The rise of entrepreneurial universities worldwide can be described in terms of 'waves' of development that affect organizational structures and move different regions and countries forward (Ivanova and Leydesdorff, 2014). US universities made up the first wave (1920–today). In particular MIT, Stanford and the University of Wisconsin were among the pioneers in defining a university-wide patent policy, establishing a technology transfer policy, setting up university-industry R&D partnerships and generating new companies (Etzkowitz, 2008; Mowery et al., 2004; O'Shea et al., 2007; Rasmussen and Wright, 2015; Slaughter and Leslie, 1997; Slaughter and Rhoades, 2004). The second wave occurred in Western Europe, from the early 1990s onwards, with universities in the UK, France, Belgium, the Netherlands and other countries transforming themselves into entrepreneurial institutions with a commercial responsiveness to social and economic stakeholders (e.g. contract research, government-sponsored industry-university research partnerships) and the establishment of a support infrastructure for academic entrepreneurs (e.g. patenting policies, technology transfer offices, science parks and business incubators) (Etzkowitz, 2008; Wright et al., 2007). In recent years, a third wave of academic knowledge transfer has been taking place in emerging economies in Eastern Europe, Asia and Southern America, where academic entrepreneurship and the creation of entrepreneurial universities are high on the political agenda and actual pioneering activities have started. It is not clear as yet what policies or structures are needed to foster the effective transfer of academic knowledge and incubation of start-up firms, and thus encourage socio-economic development.

The BRICS countries – Brazil, Russia, India, China and South Africa – are among the main emerging economies. They have substantial growth potential and are now making considerable progress in science and technology, innovation and industrial performance (Gokhberg et al., 2012). However, as Gokhberg et al. (2012) point out, these initial successes may not be sustainable and, eventually, their growth strategies may encounter problems involving innovation-driven development. Considering the broad variety among the BRICS countries, each with its own distinctive institutional heritage, cultural values and national innovation systems, it is difficult to identify the key elements and the results of this third wave of academic knowledge transfer. With its similarities in political and economic policies compared to the USA and Western Europe, Brazil – the third largest BRICS economy, China and India (World Bank, 2016) and the preeminent country in Latin America when it comes to R&D investments and scientific publications (Olavarrieta and Villena, 2014) – faces difficulties in fostering innovative and technology-based enterprises. In Brazil, industry and academia have evolved separately, although in recent years, government policies were implemented to update existing legislation and bring companies and universities together through technology parks and business incubators (OECD, 2013). The promotion of innovation and entrepreneurship through the development of innovation ecosystems may play an important role in generating socio-economic change, in particular in emerging countries (Guerrero and Urbano, 2017; Yigitcanlar et al., 2017).

Although, in Brazil, government and business incubator policies are similar to those developed in the US during the first wave (ANPROTEC, 2012), the country's entrepreneurial university model appears to be less efficient when we look at the extent to which scientific knowledge has been translated into marketable products or business models. In terms of patent ownership, Brazil is different from Western Europe, where 70% of all patents are owned by companies, while in the US and Brazil, most academic patents are owned by universities (Amadei and Torkomian, 2009; Gorgulho, 2012; Lissoni et al., 2008; Oliveira and Velho, 2009). In addition, the average number of academic patents licensed by companies in the US is 32% (Thursby and Thursby, 2007), compared to 8% in Brazil (Dalmarco et al., 2011), which calls into question the efficiency of intellectual protection promoted by universities (Boldrin and Levine, 2013; Leydesdorff and Meyer, 2010). Brazil has an environment that is characterized by an outdated industrial sector that is only loosely connected to universities and research activities. Although Brazil is a country that clearly belongs to the third wave mentioned earlier, it is facing difficulties with regard to the implementation of best practices developed by American and European universities. It is unclear which policies or structures are needed to foster the transfer of academic knowledge and the incubation process in an emerging economy like Brazil, as a way of improving its national socio-economic environment. Since universities are efficient when it comes to creating valuable knowledge, perhaps the way to transfer such technologies is by fostering the creation of spin-offs from research projects (D'Este and Perkmann, 2011). Most Brazilian universities have by now established business incubators to coach these ventures, while spin-offs may provide a way to license the repository of patents within technology transfer offices (TTOs).

The aim of this study is to identify potential activities and policies that help encourage academic technology transfer and spin-off creation in Brazil, as part of the third wave described earlier. To that end, an analytic framework was constructed on the basis of the characteristics of entrepreneurial universities (Abreu and Grinevich, 2013; Åstebro et al., 2012; Rasmussen and Borch, 2010; Vohora et al., 2004), consisting of five dimensions: entrepreneurial perspective, external links, access to university resources, innovation arrangement and scientific research. The research focused on cases involving academic technology transfer, identifying any best or worst practices and relevant other aspects of our proposed framework (e.g. access to university resources, innovation arrangement) through interviews with incubatees, incubator managers and professors enrolled in entrepreneurship classes. It is argued that academic entrepreneurship can provide a way to market patents being generated at universities, either through spin-offs from research projects or the creation of start-up companies by academics.

This article is structured as follows. In Section 2, the key literature on academic entrepreneurship is reviewed, followed by the introduction of a general framework for analyzing the entrepreneurial university in Section 3. Section 4 highlights the emergence of the entrepreneurial university across the globe in three distinct waves, with the United States being the pioneer, Western Europe the fast follower, and emerging economies like Brazil playing the catch-up game. In Section 5 the research methods, sample selection and data collection are discussed. The final sections, Sections 6 and 7 contain this study's main results, added with a further validation and extension of Brazil's entrepreneurial university model. The concluding section of the paper refers to the importance for Brazil's university system of having a dominant entrepreneurial drive and the supportive innovation and incubation arrangements in place.

2. Academic capitalism and the entrepreneurial university

While the transfer of technology has been studied between and within large companies across different countries as a management issue (e.g. Estorilio et al., 2017), the last two or three decades knowledge transfer has been increasingly aligned with academic entrepreneurship. In North America, Western Europe and elsewhere,