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Higher education and third mission' dynamics: DEMOLA case study

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Abstract
The third mission appears as a bridge between Higher Education Institutions and their environment, becoming a key element for solving current problems that hopelessly need a dynamic response in real time. Through the transfer of knowledge and technology, Higher Education Institutions stimulate industry and society, becoming a key agent in the approach to innovation and entrepreneurship, as a facilitator for sustainability development. This study aims to understand the benefits of Higher Education Institutions Third Mission dynamics as a stimulating factor in the globalisation of the economy and the evolution of the community, the global development of industry and the evolution of society. It uses a case study of the 1st Batch of the DEMOLA Project, developed in the 1st semester of 2021, at the Polytechnic Institute of Cávado and Ave, Portugal. Results seem to show that co-creation projects develop a big set of the needed 21st skills among all participants as well as enhance the interaction between HEI and its stakeholders, based on competitiveness and sustainable development.

Keywords: Third Mission, Higher Education, entrepreneurship, innovation, co-creation

Introduction

Higher Education gained special relevance after the Second World War, when an awareness that economic growth was not only due to factors production-labor and physical capital hit, but also due to technical progress and education, with a clear and drastic political interest in stimulating education and looking at it as an investment (Caraça *et al*., 2015) [8]. It was understood that there was an increased need for qualified Human Resources to meet the needs of the production system.

Since then and due to so many disruptions and challenges worldwide it is absolutely needed to link Education with societal and market needs. Higher Education system and industry must be closer to boost the interchange of knowledge and technology (Ankrah & AL-Tabbaa, 2015) [3], while justifying their survival in society across their output and impact (Piirainen *et al*., 2016) [22]. In what concerns supporting the economic growth of regions, HEI should also integrate civil society, perceived not only as the social framework of innovation dynamics, but also as an supplementary and key actor in innovation processes (Ferreira & Carayannis, 2019) [15].

Higher Education Institutions (HEI) can have a critical task in this going on process, as it can provide a transformative open platform for cooperative creation knowledge throughout education, innovation, research, and culture (Dieguez, *et al*., 2021) [14]. Implementing new educational approaches where students can contribute and have a proactive role can be an effective answer (Abdurashidovich & Botir, 2020) [1].

Students of today are the leaders of tomorrow and they must be aware of the important role they can have to build a better future (Dieguez, 2018) [12]. However, students want to have a more proactive role in its learning process and Higher Education must provide new methods and methodologies able to answer students' desires and needs (Dieguez *et al*., 2022) [13]. How to engage them and how to better answer needs in a changing environment?

This study aims to share some best practices already developed in IPCA, The Polytechnic Institute of Cávado and Ave, based in Portugal. After some literature review, a case study is presented.

Literature

Over time, HEIs began to become not only institutions for teaching (first mission) and researching, but also for transferring its results to the market (third mission), assuming a role as protagonists in economic, social, and cultural development (Audy, 2017; Schmitz *et al*., 2017; Vefago *et al*., 2020) [5, 27].This third complementary mission is revealed through the generation, use, application, and valorization of knowledge with external stakeholders and society to gain a leading role in economic growth and regional development (Nsanzumuhire & Groot, 2020; Secundo *et al*., 2017) [21, 24].

Involving a huge number of activities, the third mission is connected with a variety of activities, including not only (applied) research, development, and innovation, but also engagement with society that goes beyond the two traditional missions of education and research of HEIs (Laredo, 2007; Piirainen *et al*., 2016) [19, 22]. It thus reflects HEI-industry collaboration, collaboration that is now considered an economic driver. HEIs harness the expertise, acquired through their core missions, and send it to industry and society, contributing to economic development (Rajalo & Vadi, 2017) [23].

The term "entrepreneurial HEI" then emerges, applied to HEIs that adopt this third level and transcend their traditional missions through advanced innovation and technology transfer (Secundo *et al*., 2017) [24]. This transition takes place through the activities and assets of an entrepreneurial HEI, such as technology transfer, licensing, science labs, incubators, university spin-offs (Hsu *et al*., 2015) [17] in a co-creation opened environment.

But this knowledge transfer between HEIs and external actors offers enormous advantages for both parties, often covering global and societal challenges (Chedid & Teixeira, 2017) [10], triggering "virtuous coevolutionary circles" between research, education, technology, business, and services, and enhancing the intangibles represented by a region's social capital (e.g. culture, traditions, environment, lifestyle, social inclusion and cohesion) (Frondizi *et al*., 2019, p. 2) [16]. Technology transfer thus enables technology developed in HEIs to be transformed into marketable products (Frondizi *et al*., 2019) [16]. Academic engagement, encompassing staff mobility, training, collaborative research, contract research, consultancy, and networking (Bölling & Eriksson, 2016) makes it possible, in addition to education and teaching, to develop and accumulate human capital (Arbo & Benneworth, 2007) [4], a key resource within inter-organisational transactions (Albats *et al*., 2020) [2].

The Triple Helix concept presents HEI-business-government interaction as the key to improving the conditions for innovation in a knowledge-based society (Kim, 2013) [18]. This is a heuristic essay, which seeks the path to innovation through the study of economic forces, legislation, and regulation by governments (regional or national) and the theoretically endogenous dynamics of transformations brought by science-based inventions and innovations (Leydesdorff, 2012) [20]. However, this model does not consider the integration between economic growth, social equity and environmental concern, components related to sustainable development (Shepherd & Patzelt, 2011) [25].

Recently, this model has evolved to include a fourth helix, represented by the "media and culture-based public" and "civil society", and a fifth helix, represented by the "natural environments of society" (Frondizi *et al*., 2019) [16]. Governments would like, as a matter of policy, to ensure through funding mechanisms that HEI positively build on regional and national development through research and development, leading to innovation, knowledge exchange and technology transfer, also favoring, sustainability (Frondizi *et al*., 2019) [16].

Methodology

This study aims to understand *the benefits of Higher Education Institutions Third Mission dynamics as a stimulating factor in the globalisation of the economy and the evolution of the community, the global development of industry and the evolution of society. It uses a case study of the 1st Batch of the DEMOLA Project* conducted a case study on the Polytechnic Institute of Cávado and Ave, a young Higher Education Institute, based in Portugal.

The DEMOLA project is a co-creation project that boosts the concept of entrepreneurial HEI, bringing together the Triple and even Quadruple Helix models, resulting in a collaboration between HEI (the students and facilitators), the industry (companies), the government (Portugal 2020) and the society, since all these actors work as a team to provide solutions to society's problems. This HEI-industry-government-society collaboration represents co-creation, and the emergence of an entrepreneurial HEI fosters a "third mission" of contributing to economic and societal development (Trencher *et al*., 2014) [26].

The participants were students, teachers/facilitators and the environment were industry, government, and society. The project named DEMOLA, occurring during the first trimester of 2021, brought big opportunities for all the stakeholders and data for this case study were gathered through a mix methodology with questionnaires: 3 surveys, namely one for students, another for facilitators and another one for companies. The used questionnaire for students was already validated by Costa *et al*., (2021) [11]. The questionnaire for facilitators and companies was based on Catalá-Pérez *et al*., (2020).

Questionnaires were sent to participants of DEMOLA project through the institutional email of the HEI, to all 86 (66 students; 11 facilitators; 9 companies), between 28 November 2021 and 7 January 2022.

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Findings

As previously mentioned, 3 surveys were conducted: one for students, another for teachers/facilitators and one another for companies. The main findings were the following:

- **Students**

The questionnaire had three dimensions and it was in line with the article by Costa *et al*., (2021) [11]. It´s dimensions were the perception as a student, the perception of the co-creation contribution and the perception of personal development. Students feel that the co-creation sessions

brought value to the developed activities (95%) and it was worth participating (100%). It has changed their attitudes toward new challenges in 93% of the cases, contributed to entrepreneurship emerge of new business ideas (88%) and improvement of the ability to work in a multidisciplinary and multicultural team (96%). As what concerns skills the participation improved their initiative and project management skills (93%), creativity skills (94%) and technical skills (84%).

These results are like the ones presented by Costa *et al*. (2021) [11] and in accordance with the literature review. Students need to be motivated and prepared to enter the marketplace. Results seem to conclude that their participation in DEMOLA project helped them to develop a set of skills/competencies and enhancement of teamwork in a multidisciplinary and multicultural environment.

- **Facilitators**

Teachers/facilitators feel that their participation in the project contributed to new type of teaching and learning environment (100%), as well as new opportunities for cooperation (91%). They feel that working with companies, with real problems, enhances the networking, let them deeply experiment their research (100%) and close the gap between university and industry (100%). It is important to note that teachers highlight the additional value of teamwork in a multidisciplinary and multicultural environment.

These results are in accordance with the literature review Catalá-Pérez *et al*., (2020) and seem to show that projects like DEMOLA can be innovative tools and methodologies for applying in their professional lives, enhancing creativity and motivation for students.

- **Industry**

Industry's participants feel that their participation in DEMOLA project brings new knowledge, perspectives, and insights for the company (100%), bringing an innovative culture (100%) and better access to the best talents for recruiting soon (100%).

These results are in accordance with the benefits of these kind of projects defended by Costa *et al*. (2021) [11] and in the literature review. For HEIs, this HEI-industry relationship is also relevant as it allows them to raise additional funding, market their research, consultancy services and train their students. Additionally, it can provide access to knowledge that they do not possess and that is only possible with direct experience with companies, as well as create employment opportunities for students and have access to specialised resources that they often do not possess (Chedid & Teixeira, 2017) [10].

Conclusion

World is changing and more competitive. Higher Education has a key role in the sustainable development, being able to successfully educate, research and transfer knowledge to solve societal and environmental problems. New and innovative methodologies are needed to motivate students to critically and creative think, as well being able to work in a multicultural and multidisciplinary environment. Teachers must have the opportunity to work closer to industry, as it makes them also improve research, networking, and transfer knowledge to society. Companies need to share risks and to attract talents. Results seem to show that co-creation projects have favorable effects on dynamics, skills, research, and motivation for all the involved actors. Innovative culture and models are developed, bringing Higher Education closer to industry and society. DEMOLA project is an interesting methodology to use in HEI to prepare *a sustainable development and future. Results seem to show that co-creation projects develop a big set of the needed 21st skills among all participants as well as enhance the interaction between HEI and its stakeholders, based on competitiveness and sustainable development.*

As main limitation of this study we point out the number of samples. For future research it would be interesting to monitor results for the future batches as well as compared them with results from other co-creation projets.

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