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Entrepreneurship education in the new knowledge economy: how can university, industry and government sectors collaborate?¹

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Paper aim and applicability to conference theme: The paper proposes a new model of entrepreneurship education that seeks to bridge theory, policy and practice by bringing together university actors with industry and policy makers to aggregate resources and compliment one another in the design and delivery of entrepreneurship education.

Introduction

Over the past few decades, scholars and practitioners have been grappling with questions around the future of higher education in the global knowledge economy. Universities are no longer seen as the only sites of knowledge production. This is especially the case in the sphere that has been described as mode 2 knowledge, that is, knowledge produced within the context of the application (Gibbons *et al.*, 1994). The new production of knowledge is based on a transdisciplinary, heterarchical, boundary-spanning approach. This approach aggregates and integrates inputs academic, industry and government stakeholders (Godin and Gingras, 2000; Hessels and van Lente, 2008).

In recognition of the foregoing, universities in the developed world and many emerging economies have been undergoing a process of transformation in response to disruptive and consequential changes occurring in the knowledge-producing sector. The ongoing transformation in the sector is in keeping with epochal transformations of universities, from their profile as storehouses of knowledge in the medieval period to knowledge factory in modern times to current transformations to knowledge and innovation hub. The new and current changes recognise the changing role of universities as facilitators of a multi-sectoral and multi-stakeholder, boundary spanning process of knowledge production (Youtie and Shapira, 2008). In line with this, some scholars have proposed a concept of the “entrepreneurial university”, which, in addition to the traditional mission of research and teaching, now embraces “economic development” as a third mission (Etzkowitz *et al.*, 2000).

Method

This paper presents a new conceptual framework that explicates the opportunities for synergy across the triple helix of university, industry and government sectors for entrepreneurship education. In the following sections, we synthesise insights from extant literature to discuss the triple helix as a model of university-industry-government innovation. We then proceed to explicate how the synergy between the three sectors can inform a new model of entrepreneurship education that is best suited to the 21st century knowledge economy.

The triple helix: a model of university-industry-government innovation

As the world emerges from the industrial society to a knowledge economy, the changing landscape has necessitated debates and discussions around the transformation of knowledge infrastructure in response to the dynamic changes, challenges and opportunities of a knowledge-based economy. Among competing ideas and theories, the Triple Helix has emerged as one of the dominant models of institutional arrangement that is best suited to the new production of knowledge and economic growth. The central thesis of the Triple Helix is that the expanding role of the knowledge sector has precipitated new interactions among

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previously distinct and often disconnected institutional domains of university, industry and government (Leydesdorff and Etzkowitz, 1996). These dynamic interactions have led to the emergence of an integrative, boundary-spanning institutional arrangement in which “industry operates in the Triple Helix as the locus of production; government as the source of contractual relations that guarantee stable interactions and exchange; (and) the university as a source of new knowledge and technology, the generative principle of knowledge-based economies” (Etzkowitz, 2003, pp. 295). The Triple Helix is thus characterised by the emergence of hybrid organisations at overlapping institutional spheres (Etzkowitz and Leydesdorff, 2000).

The origins of the Triple Helix can be traced to the analysis of the differences and interactions between the nation-state and the economy, and the two processes that account for this differentiation: the functional differentiation between sciences and the markets; and the institutional separation between private and public control (Leydesdorff and Etzkowitz, 1996). The formation of the Triple Helix begins with collaboration among the trio of university, industry and government, each of them bringing knowledge, expertise and resources from their traditional institutional spheres. This proceeds to the next phase in which the continuing interactions produce a transformative impact on each of the Triple Helix partners. That is, while each partner maintains its distinct identity and primary roles, it begins to develop capabilities and take on roles traditionally associated with the other partners (Etzkowitz, 2003).

One major implication of the Triple Helix model is the ongoing transformation of the university system. It is argued that, within the context of the changing landscape of knowledge production, universities need to embrace the third mission of economic and social development, along with the traditional roles of teaching and research. In effect, the university of the future is seen as the entrepreneurial university able to function, not merely as knowledge factory but as a boundary-spanning innovation hub bringing industry actors and government stakeholders together (Etzkowitz *et al.*, 2000; Bjerregaard, 2010). The enactment of effective university-industry-government collaborations is dependent on a range of environmental and individual factors, including technology and ecology, organisational culture and structure, and behavioural and psychological factors (Adegbile, Sarpong and Kolade, 2021).

Entrepreneurship education and economic development: a collaborative endeavour

Entrepreneurship education programmes are not homogenous because different entrepreneurs at different stages of their entrepreneurial endeavour require different types of knowledge and competencies. Therefore, an entrepreneurship education programme may be targeted towards creating awareness about opportunities for small businesses or be aimed towards providing practical skills for those seeking to make the transition from traditional employment to self-employment. Finally, it can be aimed towards continuous skill development for existing business owners who want to enhance and update their skills (Henry, Hill, & Leitch, 2005).

There is general agreement among scholars that, in order for entrepreneurship education to achieve the main aim of transmitting skills required by the entrepreneur, it has to be modelled and structured differently from conventional, class-room based mode of learning. It has to be action-oriented and practical, focusing on specific tasks, and cognisant of the uncertain and unpredictable environment in which entrepreneurs have to operate and make decisions (Gibb, 1987; Rae, 2004; Galloway *et al.*, 2005). From the human capital perspective, entrepreneurship education is seen as an effective channel to develop entrepreneurial, technical and management skills necessary to enhance labour productivity and promote innovation and creativity (Cooney, 2012). The success or otherwise of EE programme are also linked to the quality of specific curricula and the effectiveness of delivery approach. For example, didactic and class-based lectures are less effective, and participants also tend to benefit from instructors who have some real-life experience as entrepreneurs or are supported by real-life entrepreneurs (Ahmad, Ismail

and Buchanan, 2014). This underlines the imperative for collaboration among university, industry and government sectors.

Industry contribution

University-industry collaboration offers an auspicious opportunity to tackle two complementary problems: the need for entrepreneurs to access new knowledge that can enhance their competitiveness and productivity, and the need for students to acquire practical experience (Nakagawa *et al.*, 2017). The logic of hybrid, boundary spanning collaborations suggest that universities are not exclusive knowledge producers, neither are industry actors exclusive knowledge users. Nevertheless, each of these actors have unique attributes, resources and capabilities that they bring to bear into the triple helix for entrepreneurial training and development. Within the triple helix, institutional logics typically converge as stakeholders cultivate a shared space for knowledge exchange and communication on joint projects (Bjerregaard, 2010). Industry actors provide the opportunity for real-world experience that cannot be enacted in the classroom. They provide the platform for aspiring and nascent entrepreneurs to test and refine their ideas in the day-to-day crucible of entrepreneurial graft. The iterative, sometimes spontaneous process of decision making and adjustment and response to new challenges and opportunities are essential to the entrepreneur's formation and development. Every entrepreneur has to grapple with practical, day-to-day challenges that cannot be enacted in the classroom. These include management of human resources, including workers engaged on adhoc or more formal basis; management of networks of relationships with suppliers and customers; and vertical relationships and interactions with regulators and policy makers.

Industry actors can contribute by enriching entrepreneurship education curricula with real world insights and practical examples that deepens students' understanding of the entrepreneurial process. These practical examples enliven and complement theoretical insights. In addition to this critical contribution to entrepreneurship pedagogy, industry stakeholders also offer the platforms for on-field practical learning and experimentation. For entrepreneurship education to be complete, students need to go out there into the world and use their knowledge and skills to create and capture value. In doing so, they can expand their knowledge horizons and strengthen their skill portfolio to become more capable and successful entrepreneurs. In other words, industry contributions to entrepreneurship education curricula enable students to be, at once, better knowledge producers and knowledge users.

Government contributions

The public sector play a key role in shaping the training and development of entrepreneurs. Governments enact entrepreneurship education policies to promote entrepreneurship and to stimulate entrepreneurial knowledge and skills (Dahlstedt and Hertzberg, 2013; O'Connor, 2013). These policy interventions are typically aimed at increasing the level of entrepreneurial activity and productivity (Hernández-Sánchez, Sánchez-García and Mayens, 2019). Operationally, policy instruments and associated funding are often used to drive and support quality assurance framework for monitoring and evaluating the development and delivery of entrepreneurship education programmes in universities and other institutions of higher learning. Within the diverse and heterogenous landscape of entrepreneurship education programmes, these regulatory processes are essential for ensuring that specific objectives of specific entrepreneurship programmes are achieved with the right curricula and training contents, and associated training for trainers (Kozlinska, 2011; Williams and Nadin, 2012; Olofinyehun, Adelowo and Egbetokun, 2018). For example, an entrepreneurship education programme aimed at university undergraduates will have contents and elements that are bespoke for that cohort. This will be different from, say, continuing education programmes

aimed at business executives with cognate experiences, or a programme aimed at less non-university educated youth seeking to explore opportunities in the informal sector.

In addition to direct contributions to and impact on the development of rich and up-to-date entrepreneurship education curricula, governments also play a key role in the development of the entrepreneurship ecosystem (Belitski and Heron, 2017). The entrepreneurship ecosystem is, among other things, a co-created system for continuing knowledge production and knowledge exchange among actors engaged in or associated with entrepreneurship activities. These include venture owners and entrepreneurs across the whole spectrum of industries, as well as suppliers, consumers, prosumers and other stakeholders who make the market tick. In the 21st century knowledge economy, it is important that active learning continue apace beyond the walls of the university and other formal learning spaces. Government can play a key role in promoting an open innovation environment where knowledge can be more easily shared. Policies promoting digital inclusion and access to cheap broadband can stimulate the entrepreneurial ecosystem by enabling knowledge exchange via digital platforms (Garriga, Krogh and Spaeth, 2013; Belitski and Heron, 2017; Aziz and Naima, 2021).

University contribution

Universities, with their traditional positioning as the primary locus of knowledge production (Etzkowitz *et al.*, 2000), play a leading role in the development and implementation of entrepreneurship education programmes. Within the triple helix, the university is not cast in the role of the unilateral provider of entrepreneurship education curricula. Rather, the university facilitates and coordinates the collaborative process that aggregates and integrates critical contributions from industry stakeholders and policy-makers (Hessels and van Lente, 2008). In order to perform this function effectively in its role, universities need to embrace entrepreneurial culture and structure in the drive to combine the third mission of economic development with its traditional mission of teaching and research (Etzkowitz *et al.*, 2000; Wong, Ho and Singh, 2007). The entrepreneurial outlook will drive the development and expansion of the university entrepreneurial ecosystems, bringing together technology transfer office, academic founders, business owners, investors, and business incubation and accelerator facilities. (Prokop, 2021). This ecosystem enables the university to move beyond “teach a man/woman to fish” to giving them the tools and space to fish. In other words, it enables universities to provide viable spaces for active learning and practical experimentations and applications. In turn, incubated ventures and spin off companies from universities tend to have strong positive impact on regional entrepreneurial ecosystems (Fuster *et al.*, 2019).

In order to achieve its entrepreneurial outcomes, universities need to be at the cutting edge, not only of knowledge production but also of knowledge commercialisation. To this end, the field of entrepreneurship education will need expand to embrace more specialist contents and contexts, including those relating to specific disciplines and industry sectors (Calvo *et al.*, 2019; Forliano, De Bernardi and Yahiaoui, 2021). This is exemplified by the development of specialist entrepreneurship training programmes for scientists and engineers (Lamine *et al.*, 2021; Snihur, Lamine and Wright, 2021). In line with this, there are also growing interests in the new field of academic entrepreneurship and the associated gaps and opportunities to educate and equip researchers with relevant knowledge and skills to commercialise knowledge (Fischer, Moraes and Schaeffer, 2019; Civera, Meoli and Vismara, 2020; Guindalini, Verreyne and Kastle, 2021).

Conceptual framework

Given the foregoing, the central argument of this paper is that a co-creation model, bringing together the triple helix of university, industry and government stakeholders, is best suited for

effective design and delivery of entrepreneurship education programme. To address this problem, this paper proposes a conceptual framework that frames the process of entrepreneurship education design and delivery within the canvas of the Triple Helix model of university-industry-government partnership. This model affirms the primary role of the university as the leader in the process of knowledge production through training for skill development and competence building. They are, however, actively joined in this by industry practitioners in designing and delivering EE programmes that are based on problem-based learning and real business/life experience. The government contributes through its active involvement in quality assurance processes, through innovative policy interventions, and by using its convening powers to support and incentivise the triple helix partnership.

The model identifies the industry sector as the leader in market activities including new venture launching in collaboration with the university who would set up incubation units and partner in the creation of science parks and other platforms for innovation and new venture creation. Finally, in this boundary-spanning approach where each of the key actors take on the role of the other, the government also participates in the market activities, by acting both as buyers as well as venture capitalists. The first market role of the buyer can be achieved through strategic procurement activities aimed at new ventures. This can help stimulate the market and the entrepreneurial ecosystem, making it easier for nascent entrepreneurs to survive the proverbial ‘valley of death’ in the life of new ventures. The same goes to its role as venture capitalists, providing start-ups with the necessary funding to actualise their entrepreneurial ideas and contribute to national productivity and welfare.

Thus, in the framework, four outcomes of entrepreneurship education can be identified: entrepreneurial competencies and skills, entrepreneurial intention, new venture launch, firm performance/survival. These outcomes are each broken down into a set of key operational metrics. For example, in order to launch a new venture, the entrepreneurs needs to mobilise capital, develop a clear strategy for human resources. They will also need a space, either virtual and/or physical, to run their new business. The activities leading to these outcomes, contributed by the whole spectrum of actors in the Triple Helix, are in three broad categories: curriculum design; curriculum delivery; and support for start-ups.

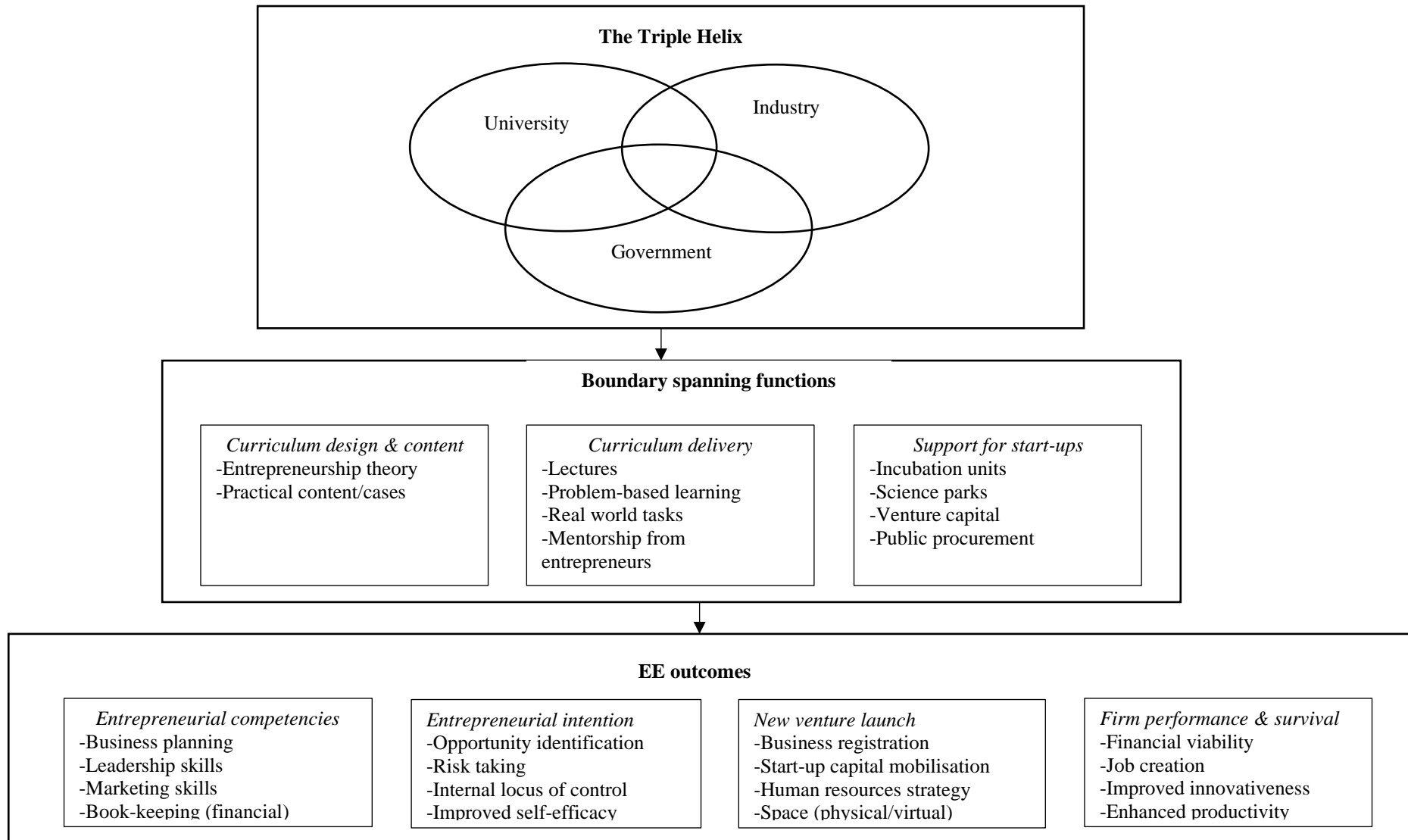


Figure 1. A triple helix model of EE provision and outcomes (Source: The Authors)

Conclusion

The new knowledge economy presents universities with new opportunities to re-invent and reposition themselves beyond their traditional profile as sites of knowledge production and channels of knowledge dissemination to active facilitators of economic development. In order to achieve this, universities need to embrace a heterarchical, boundary-spanning approach where they convene and coordinate stakeholders from industry and government sectors to provide new platforms and opportunities for entrepreneurial learning and experiential applications for value creation and value capture. The ensuing new model of entrepreneurship education will not be restricted to the classroom, or left to academic researchers, but will include provision of incubation and innovation spaces and the co-option of industry practitioners in the design, development and delivery of a dynamic entrepreneurship education and training.

A triple helix model of entrepreneurship education can bring industry actors to the heart, rather than the periphery, of the design and delivery of entrepreneurship education. Most of the current models co-opt business owners and industry actors as guest lecturers or internship hosts in university designed programmes. A triple helix model offers a more integrated and synergistic approach for university-industry collaborations. Furthermore, by bringing policy makers in, not just as funders and regulators of university programmes but as active participants and co-creators, it offers an opportunity for an ongoing revision of policy to meet current realities and requirements in the labour market. It also offers, among others, more efficient and result oriented deployment of policy instruments, such as public procurement.

The new landscape of entrepreneurship education will also be characterised by the emergence and expansion of specialist programmes and bespoke provisions that addresses the needs of specific groups, such as scientists, engineers and university academics. It will also entail the expansion of new platforms and modes of knowledge exchange and innovation facilitated by digital technologies. The “deregulation” of entrepreneurship education provision has been accelerated by Covid-19 pandemic and the increasing popularity of massive open online course providers. National governments, especially in developing countries can play a key role in infrastructural provision and other instrumental policies to bridge digital divide and promote open innovation and knowledge exchange.

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