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**Chapter**

# An Integrated Model for Invigorating Innovation and Entrepreneurship in Higher Education

*Teboho Pitso*

## Abstract

The growth trajectories of innovation and entrepreneurship within higher education have largely followed discrete paths such that each developed independent of the other. The structural locations of innovation and entrepreneurship within higher education institutions have a lot to do with this strategic discrepancy. In some cases, entrepreneurship is mostly located within business schools and its focus is on teaching students' business basics and entrepreneurship basics, while innovation is located within any of the variants of university innovation hubs and technology transfer units. Innovation is also used as a buffer to shield real change and transformation in higher education especially in reference to innovative teaching, innovative education and so on, which, in essence, can best be described as improvements rather than innovation. It is also important to note that one of the critical plinths of entrepreneurship—creativity—has generally been marginalised in the core activities of higher education. While entrepreneurship has, over the course of more than three decades, gained legitimacy traction within higher education, innovation has fairly been on the margins of core university strategies but is becoming increasingly pertinent in higher education albeit in ways requiring critical reflection. However, creativity remains largely on the margins of core higher education activities, and its explicit teaching has not yet gained strong academic legitimacy. It is not clear why creativity, innovation and entrepreneurship have assumed discrete growth paths within higher education when there is such a palpable mutual reinforcement amongst these concepts. In this chapter, I report on the study I conducted in purposively selected Scandinavian and South African universities, which was aimed at: (1) better understanding how innovation and entrepreneurship are nurtured and developed in these institutions as well as the role of creativity in all these endeavours (2) identifying the key drivers of this nascent interest in innovation and entrepreneurship within higher education and why creativity remains on the margins even when the academic legitimacy of innovation and entrepreneurship increases (3) developing a more integrated model that could better coordinate the differentiated activities of not only innovation and entrepreneurship units but also those of faculties so that there is greater mutual reinforcement and shared responsibilities that could optimise the social impact of higher education academic activities and those of innovation and entrepreneurship units. Five Scandinavian universities and three South African universities were selected, and fifteen Directors of innovation hubs and entrepreneurship centres

were interviewed. While there are overlaps amongst faculty activities, innovation hubs and entrepreneurship centres, these overlaps are informal and poorly coordinated, which vitiates their total impact on society.

**Keywords:** creativity, innovation, entrepreneurship, higher education, social impact

## 1. Introduction

Entrepreneurship has had quite a chequered relationship within higher education across the globe [1–3]. It has sought academic legitimacy since the early 1940s including "dressing" itself in well-established academic nomenclature of other disciplines and has struggled to develop its own distinct scholarship although there are important positive pointers towards that direction in more recent times [4]. In the study of the history of entrepreneurship education in higher education, Pitso and Lebusa [4] describe the undergirding of entrepreneurship education on Economics and Psychology and, why this was essentially a problematic conceptualisation although it led to its gain in legitimacy as an academic discipline [1]. The origins of entrepreneurship education can be traced to the introduction of "The Management of New Enterprises" course, which was part of the 1947 Harvard Business School MBA Programme. Entrepreneurship in higher education has tended to assume this conceptualisation so that entrepreneurship came to be understood as part of business management and thus its education focused on business basics such as market analysis, business plans, franchising, and new enterprises management until in the 1970s when focus shifted to entrepreneurship basics. The vestiges of the original conception of entrepreneurship education are still visible in most university business schools that still accentuates market analysis as a means of discovering new markets and detailed business plans. Under this conceptualisation of entrepreneurship education, the dominant business logic has been that of causal problem-solving and causal strategies that have perennially been guiding managerial thinking and its variant of strategic thinking.

In the next section, I problematise and critique this entrenched conceptualisation of entrepreneurship education and argue that it has been at the heart of developing entrepreneurship within higher education in ways that marginalised creativity and innovation. Furthermore, I make a case that the definitions and processes of entrepreneurship within higher education have largely marginalised the very plinth of entrepreneurship, which are creativity and innovation, which have had an even more chequered relationship with higher education than entrepreneurship. The discrete developmental trajectories of especially entrepreneurship and innovation in higher education are outlined in the next sections. I also delve into the definitional challenges of entrepreneurship and innovation within the higher education context and suggest alternatives that could better lead to a more integrated approach to entrepreneurship and innovation. Based on these meanings of entrepreneurship and innovation, I conducted a qualitative study with senior staff members of selected universities that are responsible for business schools, centres of entrepreneurship and innovation hubs on their own experiences, perspectives and understandings of how entrepreneurship and innovation are positioned in their respective universities and how that either leads to greater fragmentation or integration as the main pattern of evolution. An integrated model that is likely to invigorate and collectively harness the strength of innovation and entrepreneurship is described and shows how it links with core university activities of curriculum and research.

## 2. Entrepreneurship and innovation in higher education: history, meanings and contexts

### 2.1 Entrepreneurship in higher education

#### 2.1.1 The historical trajectory

While some authors trace the origins of entrepreneurship education to the early 1970s [1, 4], the most probable time for the introduction of entrepreneurship in higher education can be traced to Myles Mace who introduced entrepreneurship as a course in the Harvard University Business School MBA Programme in 1947. The course was called The Management of Enterprises. Thereafter, entrepreneurship education remained largely within the ambit of university business schools with a curriculum that was mostly undergirded by Business Basics content that accentuated market analysis, business strategy and business plans as earlier stated. The dominant pedagogy was one driven by Business content with a strong mimetic pedagogy. A mimetic pedagogy accentuates the passive transmission of prescribed learning content from an expert, as the custodian of this sacrosanct knowledge, to the novice who was expected to acquire and master that knowledge. The variants of this mimetic pedagogy in entrepreneurship are coaching and mentoring where seasoned entrepreneurs guide novice or budding entrepreneurs. This approach to teaching and learning drew from the dominant research paradigm of the time, which tended to eschew human agency and action in preference of establishing a clean, universal knowledge [5]. In a very useful Ph.D. study on the dominant teaching method that drives entrepreneurship education within the Scandinavian universities, Hagg [6] identified learning-through-action as central to such endeavours. In other words, the teaching of entrepreneurship in Scandinavian countries accentuates action-oriented focus where practical learning activities and taking responsibility for one's study are the underlying learning processes of developing entrepreneurs. This approach to teaching entrepreneurs is similar to andragogic epistemologies that emphasise self-learning, strong action-oriented learning, real-life experiences of trying out things and the motivation to hold something tangible at the end of the learning process. Hagg study does not oppose this mode of teaching entrepreneurs but find it limiting in the sense that reflective critique or what he prefers to call *reflective thinking* is not integrated into this approach to teaching. He sees reflective critique as crucial in the learning of entrepreneurs in that budding entrepreneurs could learn to discern critical aspects of their practice, identify flaws and curate knowledge that could be beneficial to their practices. He also argues that this approach to teaching could build the knowledge base of entrepreneurship education and its scholarship, which is a similar point we raise in our own book chapter [4]. Teaching entrepreneurs, in the South African context, is different as it is dominated by the epistemology of mimesis where students become passive recipients of Business and Entrepreneurship Basics knowledge as premised on causation rationality and market discovery mores with the business plan as an end-product. Sarasvathy as shall be shown in the next sub-section had already challenged this approach to entrepreneurship and had advocated for effectual logic as the underlying rationality that ought to drive entrepreneurship in the twenty-first century. This approach to entrepreneurship guides entrepreneurship education in Scandinavia, other European and US regions, and is becoming the plinth of entrepreneurship all over the world since the acceptance that entrepreneurship can be taught.

While I agree with the view that entrepreneurship can be taught, my sense is that it can actually be learnt through engaged practice. Engaged practice emphasises action, active agency and relevant-to-context theoretical knowledge. However,

entrepreneurship courses, while they have increased substantially from around 2005 [1] and are becoming increasingly ubiquitous in higher education across the globe, have been beset by a curriculum that accentuates the teaching of business basics and entrepreneurship basics. This means that the underlying logic of entrepreneurship courses in higher education has been causal rationality, which foregrounded positivistic and post-positivistic philosophical underpinning. This philosophical outlook suggests that knowledge can be generated through careful observation of discrete set of ideas (variables) that are tested experimentally or via surveys in ways that lead to discoveries of universal laws and broad generalisations about the nature of reality. The nature of reality, under this view, is deemed to be objective and independent of human agency and action [5, 7]. Knowledge generated this way has guided entrepreneurship curricula over time and has led the focus of entrepreneurship in higher education to be on discovering markets through market analysis, business strategy and crafting of business plans as already indicated. It compelled entrepreneurs to think and resolve problems within the cause-effect logics such that examining causes that influence business outcomes became the mantra of entrepreneurs' training. The variant of this logic was that of business strategy that relied on understanding of the current market through in-depth market research and the formulation of a clear business plan with specific goals to be achieved over a 5-year period with clear timelines of expected outcomes and assigned responsibilities. This approach is increasingly becoming irrelevant in the twenty-first century with the advent of advanced technologies, internet of things, 3D printing and so on which disrupt long-term thinking, compel a different mindset and coping with uncertainties of the ever-changing markets. The traditional approach to business was thus premised on predictability and certainty of markets drawn from causal rationality. This approach is becoming increasingly obsolete in the twenty-first century as people need to ready themselves for dealing effectively with very volatile, unpredictable and uncertain markets where rapid advances in technology change market conditions very fast. A new thinking approach has become inevitable. Entrepreneurship curricula that are driven by business basics content such as market analysis, business plans, business strategy crafting, management control, cost analysis and financial statements as well as entrepreneurship basics such as meanings and processes of entrepreneurship, characteristics of entrepreneurs, types of entrepreneurs, business coaching and mentoring, opportunity discovery and exit strategies have become inadequate in this century. Around the early 2000, Sarasvathy [3] challenged the way entrepreneurs were trained and the then focus on developing entrepreneurship scholarship on "borrowed" concepts from other disciplines. Sarasvathy [3] suggested a different rationality from the one that accentuated the selection of means to achieve pre-determined goals. She advocated for the rationality that imagined possible ends based on available means and called it effectual logic [3]. In the next section, I elaborate on this effectual rationality but argue that this kind of logic, while representing a huge mindset shift in entrepreneurship, is up for disruption as society prepares for the digital age.

*2.1.2 Effectual entrepreneurship*

About a decade ago and in her Ph.D. study, Sarasvathy challenged the entrenched causal problem-solving approach to entrepreneurship and suggested an alternative rationality in attempting to create business value, which she called effectuation. Effectual Entrepreneurship is the decision-making heuristics that draws from extant human capability and available means (expertise, experience, existing resources and networks) to create markets (as opposed to discovering them through market research and analysis) and constantly crafting opportunities

that grow the business once it is established. It is very much premised mostly on disruptive innovations. Effectual entrepreneurship is based on effectual rationality and effectuation principles developed by Sarasvathy [3] and has since become a global phenomenon in entrepreneurship noting its presence in the US, Scandinavia, Europe and gradually in Africa. It represents a huge shift in entrepreneurship curricula in that it accentuates a different entrepreneurial mindset that illuminates opportunity crafting and market creation through using own human capabilities and the means at one's disposal, hence emphasising active human agency and action in entrepreneurship. Effectual entrepreneurship is, thus, based on a pragmatist philosophical underpinning with its emphasis on:

- knowledge generation that arises out of actions, situations and consequences in lieu of antecedent conditions that define the objectivist traditions

- practice and what works at a particular point in time and thus allowing for possibilities and continual reimagination of the business enterprise

- real problems rather than on specific methods of resolving the problem. Pragmatists opt for multiple methods and approaches to resolving problems. Pragmatist perspective does not commit to a specific nature of reality rather remains open to all forms of knowledge that can help resolve the real, practical problem

- active human agency and action in providing solutions to complex problems

- the historical, social, political and contextual nature of the problem.

Curricula that are based on effectual entrepreneurship accentuate the explicit development of risk mitigation abilities (for example, using the principle of affordable loss when crafting market opportunities), leveraging available resources, valuing innovation and creative problem-solving, learning from failure, building networks and adapting to change quite quickly [3].

### 2.1.3 Entrepreneurship in the digital age

Resolving complex problems has always been at the heart of entrepreneurship, and this will become even more central in the activities of entrepreneurship moving forward. What will significantly change will be the conditions, timeframes and means of resolving these problems. We are moving towards smart solutions and a society that hinges on advanced and intelligent technologies [8]. In the study of forces that will disrupt how society and business function authors, Daugherty and Wilson [9] identify 15 forces that will disrupt and shape societies over the next 5–25 years. The first of these forces entail the mindset, while the other forces relate to advanced technologies. Within the entrepreneurship field, these forces will shift the business of opportunity crafting and value creation in ways never imagined before. These shifts in mindset and technological advances compel a different thinking in terms of how entrepreneurs ought to be educated and trained. Building on Sarasvathy's emphasis on entrepreneurship mindset, the digital age entrepreneurship education and training would accentuate entrepreneurial mindset and technological savvy as the underlying curricular epistemology that drives the education and training of entrepreneurs.

While the entrepreneurial mindset curricular epistemology tended to focus on value innovation, opportunity alertness, risk mitigation, networks and resource leveraging as earlier stated [10], the entrepreneurship curriculum will be affected

and shaped by the 15 forces of disruption [7]. Paul Daugherty and James Wilson identify these forces as consisting of significant shift in mindsets and the increased role of advanced intelligent technologies as stated already. Entrepreneurship education will have to inculcate a growth-focused mindset in students, which will enable them to embrace and leverage opportunities that advanced intelligent technologies provide such as human-machine collaborations in co-creating value and creating smart human conveniences. Furthermore, it should shift business focus away from profits towards social impact of its activities so that a strong moral ethics drive the plinth of business. There will also be a strong emphasis on cybersecurity. Entrepreneurship in the digital age will renegotiate meanings and models of creative problem-solving as shall be conceptualised in ways that renegotiate relations between humans and smart machines, lead to smart innovations as well as business products, services and models that reflect the leveraging of artificial intelligence capabilities and human ingenuity. The entrepreneurship curriculum will also prepare students to feel comfortable with the uncomfortable and uncomfortable with the comfortable, thus preparing them to deal effectively with uncertainty.

## 2.2 Innovation in higher education

While there is the general consensus that innovation refers to the conversion of a promising idea to tangible results, the traditional meanings of innovation as disruptive and sustaining are being challenged in light of developments in artificial intelligence capabilities. There is a tendency towards understanding innovation within the framework of smart service innovation, which draws from the interconnectedness of service systems, intelligent technologies and human ingenuity to co-create value within the smart service ecosystems [11]. However, this meaning of innovation perpetuates a historical problem, that of defining innovation within the framework of Science and Technology as well as R&D. You will recall that innovation has developed distinct from entrepreneurship mainly because each evolved from different fields with entrepreneurship tracing its origins from SMEs [10]. Given that Science and Technology, R&D as well as SMEs occupy different strategic positions in higher education, which account for their fragmentation, a need has arisen to integrate innovation and entrepreneurship. First, defining entrepreneurship outside innovation makes no sense. Innovation is the intermediate stage of entrepreneurship with the foundational stage being a generated creative idea with a statistical rarity, which must be converted to tangible results during the innovation stage before being commercialised as the outcome of combined efforts of creativity, innovation and entrepreneurship. Second, the evolution of innovation from the "push" linear model towards innovation systems meant that innovation evolutionary trajectory moved from Science and Technology to national levels where all activities relating to innovation whether in private R&D, universities and governments were organised in a national systems format [12]. This approach to innovation further moved innovation away from entrepreneurship, and this strategic schism compelled me to conduct research in Scandinavia, which is quite strong on this innovation systems approach. Scandinavian countries are considered national innovation leaders, and it was particularly important to find out whether these huge strides in innovation were linked to entrepreneurship growth. As shall be shown in the findings section below, while national innovation is heavily funded by Scandinavian governments including all its activities in universities, it remains strategically alienated within universities and mostly delinked from entrepreneurship.

## 2.3 Towards an integrated approach

Creativity, innovation and entrepreneurship are better understood within the framework of the value creation spectrum. Creating value whether individually, collectively or collaboratively means meeting, at least, three conditions. First, whatever economic transformation that occurs from turning inputs into sellable outputs should be irreversible, that is, it cannot be restored to its original state. Once the transformed entity (product, service or business model) has been created, it has to be disruptive of existing and entrenched economic entities, that is, it has to create some levels of chaos or disorder, which makes the economic space uncertain and unpredictable. This is the state of economic entropy and represents the second condition for value creation to occur. The third condition relates to the fact that all efforts of value creation must lead to some kind of an economic entity (artefact) that is fit for purpose, that is, that meets or exceeds customer expectations and creates greater usefulness to customers (human conveniences). Competitiveness in value creation emerges from the reality that some value creation types and methods are far superior to others, and the essence of becoming competitive depends on creating economic entities that are distinct from those of your competitors and developing means of securing a kind of monopoly by ensuring that what you sell solved a unique problem or provides unique solutions to known problems. It is axiomatic that in order to create value, one has to develop unique and superior skills and processes. My sense is that the creation of uniqueness, that is, economic entities with statistical rarity begin with ideation. Ideation itself relies heavily on creative problem-solving abilities. Given that higher education institutions continue to generally marginalise creativity, the need has arisen to establish a unit that can serve as a link between faculties and the Science and Technology Parks of universities or any similar innovation hubs or units such as those responsible for technology transfers. This unit has to provide conducive conditions for the development of critical and creative thinking as well as conduct scoping reviews of existing research using credible scoping review protocols such as PRISMA-P so as to make it relevant to the value creation loop as described in this chapter.

The unit could also play an advocacy role in promoting critical and creative thinking within faculties. Armed with these initial ideas, I conducted a study that sought to better understand the current state of value creation from faculty through to IP commercialisation understood as consisting of creativity, innovation and entrepreneurship. Such value creation compels a design of an integrated approach to invigorating innovation and entrepreneurship within higher education as well as refine this approach into a model that can be implemented in the most efficient way.

## 3. The research study

### 3.1 The research design

The study was mainly qualitative in nature and targeted senior university staff that manages university units or centres on innovation and entrepreneurship. It also used the latest report on innovation competitiveness of South African universities as ways of identifying South African universities that participated in the study. A snowball sampling technique was used in the case of selecting staff from Scandinavian universities to participate in the study. I spent more than 3 months in Scandinavia for the purpose of this research, and the entire study took more than 6 months.

*3.1.1 Sampling and selection*

The non-probability snowballing technique was used to select research participants. I linked up with my connection at one Scandinavian university who is a Professor in the Centre for Engineering Education. We had met on a research project that involved determining the constitution and transformative potential of the Scholarship of Teaching and Learning (SoTL) in both the South African and Swedish contexts, which resulted in a book in which both of us contributed a chapter. I was appointed as a visiting researcher in the Centre for Engineering Education for 3 months. On my arrival, I met up with the Dean for Collaborations at this university who, in turn, introduced me and secured me meetings with the directors of the innovation hub, centre for entrepreneurship and a niche-focused engineering innovation hub within her university. Once the interviews with these Directors were completed, I requested them to link me up with other Directors of cognate structures spread over the Scandinavian universities. In total, 15 directors were interviewed over the course of 3 months. Eight of these directors managed innovation hubs, one director managed a niche-focused innovation hub and the rest of the directors managed centres of entrepreneurship. By means of this snowballing sampling technique, five Scandinavian universities participated in the study.

The 2017 Clarivate Analytics study of the most innovative universities in South Africa was used to select South African universities for this study. The Clarivate Analytics study focused on the partnerships that each South African university established with industry to drive innovation, the number of research outputs that were converted into innovation, patents filed and IP portfolio. The first three top universities were selected for this study. Senior managers of units of these three top innovative universities dealing with innovation, technology transfer and entrepreneurship formed part of the research participants.

*3.1.2 The interviews*

The study used semi-structured, qualitative interviews to elicit the views and perspectives of senior managers in innovation hubs and centres for entrepreneurship or similar units. The semi-structured interview schedules were used because key themes were identified in advance and related to better understanding:

1. The conditions under which each unit operated and how that either fostered or hindered the carrying out of the mandate of each selected unit. The key sub-themes that were identified in advance included the geographical conditions under which each unit operated, idiosyncratic circumstances under which each manager functioned and particularised situations. The main objective of this question was to better understand the institutional and national contexts under which each unit operated for subsequent juxtaposition and contrasting of how different institutional cultures serve to nurture or constrain the growth and development of innovation and entrepreneurship.

2. The degree of interactions that each unit facilitated with national or regional formations (government units, associations, private companies R&D), local communities, relevant cognate private entities such as the science park or similar formations, similar units within the higher education sector and faculties of the university within which each unit operated. The sub-themes identified were the multiple relationships each unit developed and how it contributed in the carrying out of each unit mandate, encounters that each unit had with their faculties and possible cooperation or resistance and sources of conflict if

any and formal accords (MOUs) signed. This question focused on the type of partnerships that each unit developed (triple, quadruple or n-tuple helices).

3. The activities of each unit in relation to broader goals of the university, region and national government. This question relates to purposeful intent of each senior manager of each unit as understood within institutional and national policy framework.

4. The intended outcomes or impact of each unit on the university and nationally. This question sought to find out the value propositions of each unit, that is, whether each unit is fit for purpose and return on investment.

The open-ended questions were intended to explore other themes or sub-themes that could emerge from the interviews and observations.

The interviews were conducted in the respective innovation hubs and entrepreneurship centres, which also allowed opportunities to observe the actual activities that took place at the time of visit but were contextualised for me by each interviewee. I also got to meet with aspirant innovators and budding entrepreneurs as they tackled their respective projects that were at different stages of becoming a prototype or spinout company. I was also given the opportunity to interview them on their projects, level of support from the structures and degree of confidence that each project will become a reality. I also observed pitching sessions where students shared and defended their ideas prior to their further processing in the innovation or entrepreneurship structures. Ten of the students that attended the pitching session and presented their ideas were interviewed in terms of the degree to which they believed they were properly prepared by the centre for this pitching session, the likelihood that their ideas can turn into a real business opportunity and the support they believed they would get from the centre in launching their businesses.

In South Africa, I interviewed Directors of Technology Transfer and Innovation units as well as directors responsible for entrepreneurship located mostly in business schools.

In order to do an analysis of the collected interviews data, an analytic coding mechanism was adopted as based on grounded theory specifically on the 1990 work of Corbin and Strauss [5], which identifies four master themes on analysing qualitative data as conditions, interactions, strategy/tactics, and consequences. Each of these themes were elaborated above and directed questions of this study. The data that emerged from the open-ended questions were analysed in terms of whether they broaden the scope of the already identified themes and sub-themes or whether contours of a new master theme are emerging. Each data piece got critically analysed on whether it fitted existing categories or whether it was a pointer to a new category.

### 3.1.3 The results and elucidation

The critical issues that came out of this exercise are:

1. That innovation and entrepreneurship in both these contexts are located in different units within the same university, resulting in the strategic discrepancy and discrete growth paths. For instance, in Scandinavian universities, innovation hubs and niche-focused innovation hubs, such as those of engineering are located in different units, have their own independent mandates, and the relationship between them is fairly informal and generally weak. In the South African context, innovation hubs have an independent existence to university business schools such that the latter tends to be considered as part of the

university core, while the former is reduced to supporting units. It is important to note that entrepreneurship is located within the university business schools in the South African context.

2. That in the case of Scandinavian universities, there is a greater push for innovation within universities driven by the government as part of its National Innovation Policy. The government fully finances the innovation hubs including paying for innovation hubs staff salaries, providing physical infrastructure and some seed funds. There are, however, a number of seed-funding units scattered all over the Scandinavian countries that provide secondary service to that of the government. Innovation hubs within South African universities are funded within the university funds and serve as supporting university units. While there are government-run innovation hubs in South Africa as well as those run by private companies, the relationship amongst them range from weak to non-existent.

3. That each of the participating Scandinavian universities had a holding company that invested in start-up companies and that the Chief Executive Officer (CEO) was often the director of the innovation hub. That university holding companies in the South African context are similarly located within the innovation hubs or units of the university.

4. That there were no direct linkages between faculties as well as the university innovation hub and entrepreneurship centre in both contexts such that a detailed value chain of entrepreneurship from faculties through to innovation hubs was not available such that faculties, Innovation Hubs and Entrepreneurship Centres functioned mostly independent of one another with generally weak interactions.

5. That staff and students accessed innovation hubs and entrepreneurship centres on a voluntary basis such that innovation and entrepreneurship remain largely on the margins of core university activities in both geographic contexts.

6. That there is no policy of integration amongst faculties, innovation hubs and entrepreneurship centres/business schools in both contexts.

7. That the infrastructure for innovation and entrepreneurship is one of the best in the world within Scandinavian universities as it is fully funded by the government. The South African university's innovation and entrepreneurship infrastructures are also quite good but could become even better with more government-focused support.

8. That both innovation and entrepreneurship do not form the plinth and core of the faculty activities in all the participating universities. There appears to be an aura of legitimacy crisis for innovation and entrepreneurship within both contexts.

9. Innovation and entrepreneurship are increasingly gaining traction within both contexts and more could be done to strategically position them within the core university activities as well as develop greater integration amongst faculty activities and those of the innovation hubs and entrepreneurship centres.

10. There is also a gradual interest on setting up innovation hubs by the private sector mostly through the corporate social responsibility vehicle, but the phenomenon is not yet ubiquitous in the South African context whereas a Science

Park appears to be the most preferred approach by Scandinavian private sector. In the Swedish context, the privately owned Science Park is located closer to the university's Centre for Entrepreneurship and has closer relationships and greater interaction between their senior managers.

There appears to be consistency between how innovation and entrepreneurship evolved within universities as discrete concepts and how they exist within Scandinavian universities. While innovation appears to have gained legitimacy traction within universities in both contexts, its position within faculties remains precarious but mostly marginalised mainly because change efforts within faculties are hampered by academic autonomy and professional identities [12–14]. There is thus a need to conduct a sociocultural study that attempts to understand these complexities, and how new ideas and concepts get integrated into the faculties mores. Based on these findings, I suggest a model that could integrate activities of faculties, innovation and entrepreneurship in such a way as to generate the least resistance, which thus substantially increases the success rate of the model. The model assumes that higher education institutions are not always malleable to changes that attempt to alter their strategic plinth and cultures of disciplines developed over the years and based on hard facts, and this is not without legitimate warrant. First, the change efforts often describe future possibilities often without adducing substantive evidence. It thus become untenable that well-established mores as undergirded by solid scientific foundations should be altered on the basis of informed conjectures. Second, future possibilities are uncertain, unpredictable and epiphantic, that is, its outcomes cannot be confirmed and guaranteed in advance. Third, there is often an ontological conflict between cultures of most disciplines and higher education visionaries (innovators and entrepreneurs). Cultures of disciplines are based mostly on the principles of generating clean, objective and universal knowledge via strict research protocols and procedures while that of visionaries rely on pragmatic considerations that focus on what practically works. To think of it, we need both in some kind of productive tension where cultures of discipline could be rid of knowledge and ideas that are at their crepuscular glow [13] and fetishistic visions could gain from scientific content. In the model that is presented in the next section, this productive tension forms the basis of the suggested model.

### 3.1.4 The integrated model for fostering innovation and entrepreneurship in higher education

The model consists of three key elements, which are faculty activities, activities of the innovation hubs and those of the entrepreneurship as they map out within higher education context. In terms of this model, faculty activities revolve mainly around research and curriculum, that is, on generation of new knowledge and teaching of existing, known knowledge. Faculties are assumed to be good at these two activities and have developed safety mechanisms of protecting these activities from unjustified and sometimes legitimate encroachment through asserting their academic autonomy and professional identities. In this model, these faculty activities are not encroached upon and faculties are expected to continue to do what they know best. The model, however, identifies a delink between faculties and innovation hubs as well as centres of entrepreneurship. It thus proposes that a unit be established that could serve to develop stronger links between faculties and the innovation and entrepreneurship units. The main purpose of the unit would be to provide a service to both the faculties and the innovation and entrepreneurship units. This service would be two-pronged. First, it would provide service in the area of Research Scoping Reviews using well-established Scoping Reviews Protocols

such as PRISMA-P. The purpose of the scoping reviews would be to go through huge research data that have been produced by the faculties so as to convert some of it into research data that can be useable during the ideation stage of innovation. For example, a recent study by Northwestern University Psychology researchers sifted through 1.5 million research data on personality types using advanced computational capabilities and came up with only four distinct personality types [11]. The psychiatric units are now grappling with ideas on how these findings could be used in practical situations to solve patients' problems and this could also lead to development of new psychiatric medical products and improved psychiatric services. This is an example of how scoping reviews studies could open new avenues of converting research into innovate ideas and exploration of new possibilities.

The unit could also assess the degree to which critical and creative thought are explicitly taught within faculties. Studies show that critical thinking and to a larger extent creativity are not necessarily priority skills worthy of being explicitly taught in faculties. While critical thinking is often considered to be implicit in faculty teaching, its explicit teaching based on the understanding that it is an emerging area of scholarship with its own nomenclature has not gained sufficient traction. Creativity has generally been eschewed within faculties [15] mainly because of the dominance of mimetic epistemologies that are deeply ingrained especially at undergraduate levels. The unit could thus provide two distinct services in these areas. First, it could serve as an advocacy for the explicit teaching of critical and creative thought within faculties. Second, it could explicitly teach these skills in order to prepare students for the ideation stage of innovation. Critical thinking helps students to develop the capabilities of constantly monitoring their thinking for significant problems in such thinking and attempting amelioration up to a point where students could function as practising thinkers [15]. Furthermore, critical thinking helps students to evaluate ideas for soundness and efficacy in resolving real, protracted problems which comes handy during the ideation stage. Creativity helps students to increase their capacity to generate ideas with statistical rarity which is an essential element of innovation during ideation stage. The unit could offer similar services to communities which include private and public sector companies as well as local communities. It is clear that the model attempts to integrate faculty work and innovation activities especially the ideation stage of innovation in ways that are non-confrontational which also goes for communities. This means that faculties and communities can continue with their apodictic activities as the unit could serve to evaluate, at the point of contact between the unit and faculties/communities, what needs to be done to achieve readiness for the first stage of innovation (ideation). It could be that some ideas/individuals/teams are ready for the second or even third stages of innovation (design and testing) or such ideas have not been judged for statistical rarity which means that such ideas will have to go through the ideation stage. In our case, the ideation stage is facilitated through measuring the creative abilities of individuals or teams by means of the standardised Torrance's Tests of Creative Thinking (TTCT) and the TRIZ-based creativity model is used to test the potential efficacy and statistical rarity of such ideas [16]. The TRIZ model is also used to ensure the statistical rarity of ideas and for increasing the ideas generation of individuals and teams coming from faculties and communities. This is integration at level 1 which I prefer to call *Integrate 1*. *Integrate 1* represents the most crucial point of the linkage which can inform the rest of the innovation and entrepreneurship value-chain. It is because embedded in its essence is a certain level of epistemic and mindset disruption with the potential to alter loyalties to certain ways of thinking, reasoning as well as commitment to certain ontological and epistemological positions. *Integrate 1* is about accentuation of active human agency and action [17] in lieu of commitment to certain conventional knowledge. It involves certain degrees

of disobedience and, to a point, demands higher levels of open-mindedness that allows exploration beyond known knowledge precincts and thus represents some kind of an intellectual and mindset crossover into new intellectual territories such that the familiar becomes strange. The strange can be frightening and intimidating and without some level of tutelage can become a negative energy that is inimical to innovation and entrepreneurship. Without properly handling *Integrate 1*, anxieties and resistance can be generated and could be counterproductive as it could affect the entire innovation and entrepreneurship value-chain. I thus counsel for involvement of highly trained change experts/practitioners to help individuals and teams from faculties and communities to ease into innovation and subsequently into entrepreneurship. Recent studies on faculty cultures show that academic freedom and professional identities are so strongly entrenched that attempts on changing faculty cultures could take years to yield results [12] hence *Integrate 1* is more about letting faculties continue with their work and setting up a unit to make faculty work (research and curriculum) ready and relevant to innovation efforts.

The next level of integration is between innovation hubs and centres of entrepreneurship (*Integrate 2*). Within higher education and as earlier stated, innovation and entrepreneurship assumed discrete locations and development, which resulted in a kind of a strategic schism. This was counterproductive as innovation is the lifeblood of entrepreneurship as creativity is to innovation. As stated earlier, in Scandinavian universities, innovation and entrepreneurship remain located strategically in discrete units and coordination efforts are, at best, very informal and not necessarily mutually reinforcing despite good intentions of senior managers in these units. A similar picture can be painted in South African universities. *Integrate 2* is thus about bringing greater coordination between these two entities in ways that are mutually reinforcing and could increase the value propositions of innovation and entrepreneurship within higher education. *Integrate 2* is thus about linking the design and testing processes of innovation closer to their social impact through scaling and commercialisation, which are entrepreneurship territories. When greater synergistic linkages are established between these two entities then both entities are able to share their process constraints and collectively attempt solutions. There is no point of prototyping and testing what cannot be scaled because eventually efforts of innovation and entrepreneurship are about social impact, that is, creating new or improved value propositions for society so that better human conveniences are developed.

The third level is between entrepreneurship centres and higher education holding companies. In Scandinavian universities, university holding companies are more linked to innovation hubs in lieu of entrepreneurship centres and the CEOs of these holding companies are often executive directors of innovation hubs. My sense is that the role of a holding company whose main purpose is to invest in spinout/start-up companies is mostly linked with scaling up of successful innovation outputs and inclines more within the entrepreneurship sphere; hence, it should rather be a negotiated sphere between both the innovation hubs and entrepreneurship centres so that the board of the holding company should be representative of both entities plus external stakeholders. This approach would also strengthen *Integrate 3* as there will be greater collaboration between the innovation hubs and entrepreneurship centres.

The fourth level is between all these higher education innovation and entrepreneurship activities operating as an integrated whole and the broader developmental agendas of society. The main purpose of any innovation and entrepreneurship endeavour is to make more people economically active, economically independent, lessen inequality and poverty, reduce unemployment and broaden the tax base.

The main purpose of this chapter was to share the study that sought to better understand conditions under which maximum social impact could be derived from activities of faculty, innovation hubs and entrepreneurship centres. Based on
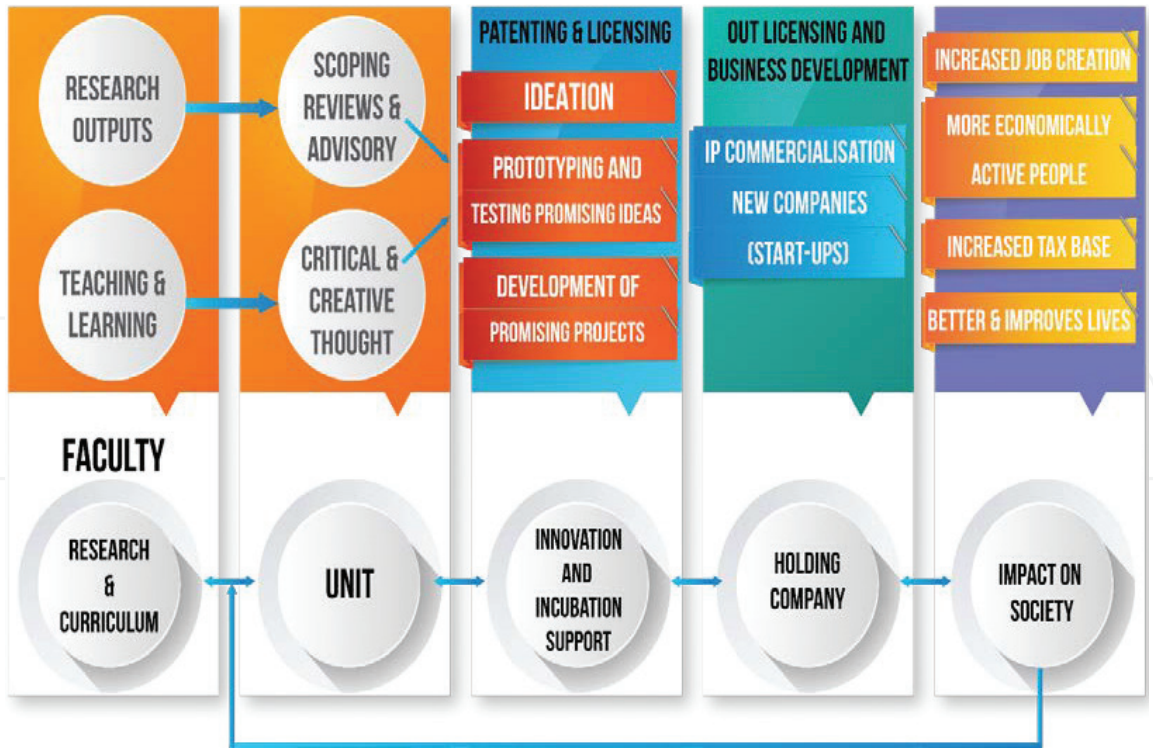
**Figure 1.**
*The integrated model for fostering innovation and entrepreneurship in higher education.*

the study of selected higher education institutions in both Scandinavia and South Africa, the emerging perspective is that of integration as holding better prospects as a pattern of evolution towards greater social impact of these higher education entities. Based on these results, I developed an integrated model of innovation and entrepreneurship that could better increase the university capabilities that could lead to greater social impact (see, **Figure 1**). The model is already shaping the policy direction of our university as the value of an integrated approach is increasingly being appreciated.

## 4. Areas for future direction of research

- There is a need to conduct more qualitative semi-structured interviews so that the master themes developed by Corbin and Strauss could be expanded. There are important signs that emerged in this study that point to such a possibility. These signs point to a *pattern of evolution* as a possible theme but requires further evidence.

- More research is needed with regard to academic legitimacy of both innovation and entrepreneurship and, what it will take for them to form core university activities.

- The model developed here requires further research and critical analysis.

- The epistemology that drives innovation and entrepreneurship teaching and training requires further critique and research.

- The role of government policy on innovation and entrepreneurship in relation to universities requires further systematic inquiry.

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## Conflict of interest

To the best of my knowledge at the time of writing this chapter, there are no known conflict of interests.

## Author details

Teboho Pitso
Vaal University of Technology, Vanderbijlpark, South Africa

*Address all correspondence to: biki@vut.ac.za

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