Converting university knowledge into value: how conceptual frameworks contribute to the understanding of the third mission role of European universities

Todd Davey
Munich Business School,
Elsenheimerstraße 61, 80687 München, Germany
and
Science-to-Business Marketing Research Centre,
Johann Krane Weg 27, 48149 Münster, Germany
Email: todd.davey@munich-business-school.de

Abstract: The importance of universities in the movement of western economies from industrial to knowledge-driven economies is increasingly recognised, there has been a greater focus by policy makers and academics on the university’s role. Resultantly, a number of conceptual frameworks have been created to capture this changing role, however, there remains a lack of clarity as to how the modern university engages a set of external stakeholders, resulting in a ‘tangling’ of conceptual frameworks explaining this ‘third mission’ paradigm. This article untangles these third mission concepts highlighting four areas of variance: the focus on public versus private good, the relation to university-business cooperation and entrepreneurship, the relation to theory and the stakeholder perspective taken by the frameworks. In doing so, it provides insight into how universities interact externally to convert their knowledge into value and make a case for a proactive approach to the third mission by university managers.

Keywords: triple helix; entrepreneurial university; regional innovation systems; RISs; university-business cooperation; UBC; technology and knowledge transfer; valorisation; university; stakeholder theory.

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Biographical notes: Todd Davey is currently a Professor at the Munich Business School as well as being author of the book Entrepreneurship at Universities. He has been the Director for the largest international study yet completed into cooperation between university and business for the European Commission conducted in 2010–2011 and again in 2016–2017 and also the Director of one of the largest studies into student motivation for entrepreneurship. Formerly a Senior Manager within Deloitte’s Technology Commercialisation Group and Strategy Director for one of Australia’s fastest growing tech start-ups. He is currently the Director of Strategy at the University-Industry Innovation Network (UIIN).
1 Introduction

The role of universities, in synergetic relationships with governments and businesses (the ‘triple helix’), is considered to be an essential driver of knowledge-based economies and societies (Etzkowitz and Leydesdorff, 2000). Considering this, universities have had their roles focussed to a greater extent on the need to contribute to society in a more meaningful way through knowledge and technology creation as well as transfer/exchange (Siegfried et al., 2007).

With the creation of Europe 2020, the European Union’s (EU) economic growth strategy for this decade, and the higher education modernisation agenda, Europe is embracing the need to create a more connected and functioning relationship between government, business and universities in order to increase employment, productivity and social cohesion (European Commission, 2011). This initiative is focussing the efforts of European policymakers more heavily on policies for increasing the impact from European universities, a counter to the historic independence of the university on the continent.

Against the backdrop of this potential for greater university impact, the role of the university has expanded from the traditional roles of education and research to include a ‘third mission’. Universities committed to the third mission, whereby universities are “a key provider of new technologies and business ventures, sometimes as a regional development engine” [Laukkanen, (2003), p.372] and play major roles in regional innovation and economic growth (Sam and Van der Sijde, 2014), have been found to achieve a number of ends. This third mission role for universities identifies the potential for universities to contribute through cooperation between university and business, entrepreneurship and societal engagement.

With respect to the contribution made through universities cooperating with business, universities have been found to contribute to the business innovation chain through technology and knowledge transfer of universities’ intellectual property coming from research (Benneworth and Jongbloed, 2010; D’Este and Perkmann, 2011) and to the human resource supply chain of firms through new graduates and employee education (Bekkers and Bodas Freitas, 2008; Ginzburg and Houli, 2013).

Furthermore, entrepreneurship has been increasingly associated with the university world and its third mission responsibility. The development of entrepreneurial mind-sets is being progressively named as the university’s role (European Commission and The Gallup Organisation, 2007; GEM, 2008, 2009) as is the creation of new knowledge-intensive businesses by academics or student start-ups. Moreover, the potential for universities to be entrepreneurial institutions has developed, a notion which envisions “an academic structure and function that is revised through the alignment of economic development” [Azèle, (2011), p.1; Fairweather, 1990] to effectively deliver on their ‘third mission’ (Lambert, 2003).

Engagement is a concept more recently tied to the university as a means to broaden the vision of how universities can contribute within the context of the third mission. As a part of a learning regional innovation system (RIS) (Gunasekara, 2006), the engaged university executes its role in close connection with its region and is not primarily focussed on cooperation with business or with entrepreneurial activities by universities.

Traditionally, the third mission has been seen as a one-way knowledge transfer from the knowledge supplier (universities) to the knowledge user (business and society) (Mitton et al., 2007). However more recently, this one-directional model has given way
to a multi-directional and multi-channel knowledge exchange (e.g., Van der Sijde, 2012) involving universities, business and government in a symbiotic relationship (Etzkowitz, 1998; Mars et al., 2012), making the execution of the third mission far more complex, and its understanding even more difficult.

In order to capture and describe this complex new role of universities, a number of conceptual frameworks and processes have been developed including the RIS, triple helix (including the quadruple helix concept), entrepreneurial university and engaged university concepts. With differing objectives, perspectives, stakeholders as well as forms of interaction/cooperation, these concepts have sought to explain how the university interacts, or at least could, with external stakeholders and society more generally. Partly for this reason, there is still a lack of clarity as to what exactly constitutes the universities third mission and how university-business cooperation (UBC), entrepreneurship and engagement relate to it (Plewa et al., 2013).

A number of authors have discussed similarities and differences between some of these frameworks (see Caniëls and Van den Bosch, 2011; Gunasekara, 2006; Mowery and Sampat, 2006) with other authors recognising the potential for substantial overlap in these concepts (Mowery and Sampat, 2006; Plewa et al., 2013; Ssebuwufu et al., 2012). However as yet, there has not been a simultaneous review of these university-related conceptual frameworks nor how they contribute to the discussion of the university’s third mission. Given that these frameworks underpin policy-level discussions about the role of the university and how universities impact their environment through the third mission, a clear understanding of each of is essential for a more robust conversation of the topic. Furthermore, despite their overlapping nature, these concepts are afforded a high numbers of citations in scientific literature, providing further justification as to why a critical review of these concepts is long overdue.

In addressing this gap, this paper investigates and discusses the historical development of the university and its influence on discussion about the university’s role as well as this broader role of universities in society bringing in to focus the ‘dispute’ between, or overlap of, these different conceptual frameworks as they relate to the university’s role. It does so by disentangling the concepts from one another by comparing them using stakeholder theory as a base, describing the origins and focus of the concepts as well as the forms of cooperation and interaction that make them up and the direction of knowledge flow.

The primary goal of this paper then is to provide clarity in relation to these related topics in order to drive a more robust conversation about how universities can contribute through the third mission. In doing so, this paper provides a much needed analysis of the conceptual frameworks which help to describe the university’s third mission to improve knowledge and understanding of policy-makers, practitioners and researchers alike. Furthermore, it builds on literature dedicated to stakeholder theory by applying it to describe the university’s third mission responsibilities. Finally, the paper will focus on the European context to create meaning for European universities.

As such, the research question for this paper can be defined as

“Which conceptual models exist that address the third mission of the university and how do they contribute to the (scientific and practical) understanding of the third mission role of the university and how it interacts with (European) society.”
2 Background

2.1 Historical development of the university missions

Important in contemporary discussions about the role of the university and its potential contribution to society, is the historical importance and development of the university itself and how that has been closely connected with the development of society.

Commencing in Europe with the University of Bologna in 1088, the ‘first generation’ universities were houses of education dedicated to ‘cultural conservation, preservation, and transmission’ of knowledge via education [Etzkowitz et al., (1998), p.1], giving rise to the university’s first mission of education.

The ‘second generation universities’ emerged in the 1800s embracing the second mission of research, partially as a means for reviving classical learning (Etzkowitz, 2001) and a response to the changing needs of society at the time. In both Europe and the USA, the industrial revolution brought with it the need to develop specific skills and knowledge and therefore, universities became more direct contributors to social and economic capitals (Breznitz and Feldman, 2010a) with a much greater public service expectation (Breznitz and Feldman, 2010b).

In Europe, two thought-leaders from that time still have great influence on discussions nowadays about the role of the university. The first, John Henry Newman, penned the ‘Idea of a University’ in 1852 and advocated universities as a community of thinkers, engaging in intellectual pursuits not for any external purpose, and with independence from religious, governments and the business world (Sam and Van der Sijde, 2014).

Wilhelm von Humboldt (Boulton and Lucas, 2011) promoted universities as bastions of pure knowledge generation with a greater focus on research and creation of new knowledge (sometime referred to as the ‘Humboldt’ Model), which was dedicated to the principles of ‘Freiheit’ or freedom and unity in teaching and research. This independence was perceived to be from the distortions of government control (Boulton and Lucas, 2011) as well as from business, despite most universities still being state funded. These staunch Newman and Humbolditian principles representing academic freedom still hamper modern efforts by policy makers and university leaders to foster external collaboration and engagement.

Despite this desire for independence, there is evidence that cooperation between universities and business began in Europe in the mid-late 1800s (Hall et al., 2001; Etzkowitz, 2001), the first signs of the third mission of regional outreach or engagement. Signs of universities having a focus on the needs of external stakeholders such as industry were seen primarily in technical disciplines (Noll, 1998; Mowery et al., 2004) and especially in the ‘development of ‘red brick’ universities and local technical institutions in the industrial cities of Britain’ [Youtie and Shapira, (2008), p.1189] an example of which is the (now) Coventry University. Some examples of research consulting, contract research and academic spinoffs by poorly paid academics were evident in Germany at the turn of the 20th century with an example being Justus Freiherr von Liebig’s commercialisation of his chemistry discoveries which took place in the late 1800s (Etzkowitz, 2001).

This contrasted with the US where a more pronounced split emerged: between those universities dedicated to basic research and freedom in teaching, which aligned with the university’s first and second mission; and applied research streams (Etzkowitz, 2001),
whereby external engagement and commercialisation were more prominent. With lesser public funding than their European counterparts, according to Rosenberg (1992), US universities were forced to be more ‘entrepreneurial’ in responding to changing socio-economic needs (OECD, 2002). A similar lack of funding of universities existed in the UK at the time, which may help to explain the leading position that British universities have developed in collaborating with industry (Davey et al., 2011).

At this time, state-funded universities grew as tertiary education expanded beyond the elite at the start of the 20th century, whilst research collaboration as well as commercialisation of laboratory findings grew in existence.

WWII marked a key moment in how the role of Europe universities was perceived, as the devastating impact of science in the war only strengthening the principle of university independence, with some countries going so far as to ban some university-business links (Laukkanen, 2003). Despite this, industry-funded basic research emerged in a stronger way after WWII (Van Looy et al., 2004) as part of the second academic revolution (Etzkowitz, 2001), although resistance to external influence and collaboration remained and is still a strong principle even today (OECD, 2007). The period after the war saw a substantial worldwide increase of not only tertiary education but also the amount of funded research taking place (Van Looy et al., 2004).

In the USA, in a measure of contrast to Europe, the crucial role of science in the war effort firmly established the role of science with a much greater focus on universities as a source of knowledge (Rosenberg and Nelson, 1994) by policy makers and industrialists. In 1980, in the USA, the Bayh Dole Act assigned intellectual property rights from publically-funded research to universities, intensifying the development of technologies for transfer to business, whilst universities began positioning themselves to increase third-party income through technology transfer (Breznitz and Feldman, 2010a). The Act also provided the conditions upon which academic entrepreneurship, in the form of new firm creation based upon academic knowledge (Bercovitz and Feldman, 2006), takes place.

**Figure 1** The three generations of university development
Over the last 30 years, as globalisation has taken effect and innovation cycles have decreased, there has been an increased in attention from governments and scholars alike on the role of the university in society (Gibb and Hannon, 2006; Maskell and Robinson, 2002) resulting in a greater focus on technology and knowledge valorisation (Benneworth and Jongbloed, 2010) and the university’s so-called third mission (Laukkanen, 2003). The ‘third mission’ has been described as ‘economic development’ (Etzkowitz and Leydesdorff, 2000), a more direct interaction and contribution to the industry (Giuliani and Arza, 2008) as well as regional engagement fully integrated with mainstream teaching and research (Chatterton and Goddard, 2000).

As the university becomes a more connected part of the innovation chain of business, this external engagement is said to increase the amount and speed of transfer of new knowledge and is central to the concept of the ‘third generation university’ (Wissemia, 2009). The premise of this third iteration university is that through greater interaction with stakeholders external to the university, the process of producing innovation and skilled ‘human resources’ can be reduced, increasing the amount of new knowledge that can be produced and assimilated.

In Europe, this expansion of the role of the university has been supported through a number of European Commission (EC) policy instruments, which have attempted to address the ‘modernisation’ of European universities. The European Framework Programmes’ introduced in 1984 were found to have contributed considerably to UBC both financially and practically (Geuna, 1998) whilst the ‘European Structural Funds’ such as ‘European Cohesion Fund’ and the ‘European Regional Development Fund’ have also been attempting to increase European innovation ecosystem collaboration. In recent years, the EC has increasingly embraced a broader and more connected understanding of how universities contribute to economic wellbeing through a number of programs such as ‘Modernisation Agenda for Universities’ (2006) and a ‘New Modernisation Higher Education Agenda’ in 2011, which stresses “the potential of European higher education institutions to fulfil their role in society and contribute to Europe’s prosperity remains underexploited” [European Commission, (2011), p.7]. More modern initiatives have been the creation of knowledge and innovation communities (KICs) as well as Europe 2020 which places universities as a vital component in European development.

Despite these initiatives, reflecting the historical development of the university in Europe and the strong tradition of university independence, the adoption of ‘third mission’ principles are still inadequate, as illustrated in the quote above, whilst levels of UBC in Europe remain low (Davey et al., 2011).

There have been studies that compared US and European UBC development with the general consensus being that that collaboration between universities and businesses has been traditionally weaker in Europe than in the USA (Rothaermel et al., 2007). European universities, particularly some institutions in Germany, Italy, Sweden, and the UK, have traditionally been rich sources of new discoveries including the development of technology, however have lagged behind in technology transfer owing to differing legal systems (Gunasekara, 2006) and factors named previously.

This has led to there being claims of there being a ‘European Paradox’, whereby “scientific and technological results are comparable, if not superior, to those of our principal partners, but” … “inferior in terms of transforming the results of technological research and skills into innovations and competitive advantages” [European Commission, (1995), p.5].
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2.2 Conceptual frameworks explaining the university’s third mission

Reflecting the development of this third university mission, a number of conceptual frameworks have emerged that help to explain this phenomenon. These frameworks have not just been developed to discuss the role of the university, but also to address the role the university plays in a broader system, at a strategic, macro level. They conceptualise ‘the role of the research university within the innovation processes of knowledge-based economies’ [Mowery and Sampat, (2006), p.7] from different stakeholder perspectives (supported by Boardman, 2009), and with different types of interactions between these stakeholders.

These conceptual frameworks, have inspired streams of literature addressing the role of the university including entrepreneurial university (Etzkowitz, 1983), RISs (Lundvall and Johnson, 1994), the triple helix (Etzkowitz and Leydesdorff, 1995) and engaged university (OECD, 1997) as well as more recent concepts which provide an addendum to the discussion including academic capitalism (Slaughter and Leslie, 1997), open innovation (Chesbrough, 2003) and the quadruple helix (Carayannis and Campbell, 2009).

The emergence in prominence of these concepts in discussions about the university has challenged and widened the role of the university to recognise a broader range of ways in which universities can contribute to societies to create a ‘modern view’ of the university role (Azagra-Caro, 2007). Topics such as entrepreneurship (Etzkowitz et al., 2001)

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Table 1: The foundation of conceptual frameworks related to the university’s third mission

<table>
<thead>
<tr>
<th>Date</th>
<th>Primary source/publication(s)</th>
<th>Conceptual frameworks</th>
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<tbody>
<tr>
<td>1982</td>
<td>Freeman, C., Technological Infrastructure and International Competitiveness</td>
<td>National innovation system</td>
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<tr>
<td>1983</td>
<td>Etzkowitz, H., ‘Entrepreneurial scientists and entrepreneurial universities’</td>
<td>Entrepreneurial university</td>
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<tr>
<td>1988</td>
<td>Lundvall B-Å., ‘Innovation as an interactive process: from user-producer interaction to the national innovation systems’</td>
<td>Regional innovation system</td>
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<tr>
<td>1996</td>
<td>Kellogg Commission, Kellogg Commission on the Future of State and Land-Grant Universities</td>
<td>Engaged university</td>
</tr>
<tr>
<td>1997</td>
<td>OECD, National Systems of Innovation</td>
<td>Engaged university</td>
</tr>
<tr>
<td>2009</td>
<td>Carayannis, E.G. and Campbell, D.F.J., ‘‘Mode 3’ and ‘Quadruple Helix’: toward a 21st century fractal innovation ecosystem’</td>
<td>Quadruple helix</td>
</tr>
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</table>
governance (Goldstein and Glaser, 2012), lifelong learning (European Commission, 2009), curriculum development and delivery (European Commission, 2009) and the mobility of academics (Kitagawa and Lightowler, 2013) and students (Lamichhane and Nath Sharma, 2010) are increasingly being recognised as important parts of the university’s three missions.

2.3 Untangling these conceptual frameworks

The importance of these frameworks in debates about the role of the university, including the emergence of the topics of UBC, entrepreneurship and engagement at universities, cannot be understated as they directly influence the understanding and execution of actions in the university space as well as provide the basis for much academic literature. Despite being crucial for understanding and framing the role of universities, substantial overlap in these concepts exist (Plewa et al., 2013) necessitating a clarification of these concepts and how they relate to each other including their overlapping and differentiating aspects. This is necessary to determine how the influence discussions about the role of the university and its third mission.

In order to clarify their respective contributions, this paper will utilise a number of factors which tease out their similarities and differences:
1 stakeholders involved in interaction (using stakeholder theory)
2 the perspective taken by the framework
3 forms of external interaction
4 nature of the interaction provides a means for clarifying and disentangling these conceptual frameworks.

For this reason, a brief explanation of the concepts will be provided.

2.4 Stakeholders involved in interaction (stakeholder theory) and stakeholder perspective

Central to describing the different frameworks in relation to the university’s third mission is the acknowledgement of stakeholders involved and impacted by it. Given that the university’s business model has evolved dramatically since the 1980s to a more interactive and collaborative one which necessitates greater external engagement, using a theoretical construct that recognises stakeholders is essential (Wilson, 2012).

Stakeholder theory recognises that stakeholders are crucial to the performance of the organisation. In doing so, the theory identifies and models “any group or individual who can effect or be affected by the achievement of the firm’s objectives” (Freeman, 1984) as well as seeks to prescribe management actions and methods in the management of stakeholders as a key source of an organisation’s performance (Steurer, 2006). Despite being historically applied to the firm and its stakeholders, stakeholder theory is now widely accepted and adopted (Elias et al., 2002) for use in diverse areas of study, including being applied to managing research and development (Elias et al., 2002) and more recently to the university business model (Miller et al., 2014).
A characteristic of stakeholder theory is the relational aspect between stakeholders with disparate interests, with “the overall stakeholder relationship as a multifaceted, multi-objective, complex phenomenon” [Harrison and Freeman, (1999), p.483]. It involves identifying a point of view and recognising their interactions with external parties.

This is an important aspect for universities because the complex nature of the university’s third mission responsibilities as well as UBC and entrepreneurship (Markman et al., 2005), and the complexity of the systems and networks that underpin them (Goddard and Chatterton, 1999), call for a sophisticated theoretical and operational tool to ensure successful understanding and management. In the situation of the university engaging in its third mission whereby a complex array of stakeholders, both directly and indirectly involved, interact to create outcomes, taking a relational nature of stakeholders and their needs becomes even more important. Thus, by applying stakeholder theory to the university and its third mission, the complexity of complex interactions of their stakeholders can be reduced by developing contingency strategies that identify and prioritise stakeholder interests (Abd Karim et al., 2007).

For these reasons, stakeholder theory offers substantial potential for use in describing and analysing the third mission role of the university, including UBC, entrepreneurship and engagement of universities. The named macro conceptual frameworks accept the university and its three missions as a core tenet; however, they provide an understanding of the role of the university from a number of different perspectives.

2.5 Forms of external interaction

Given that executing the third mission for universities involves forms of external interaction (Giuliani and Arza, 2008), the forms of interaction with these external stakeholders provide valuable insights into the difference between these frameworks.

Entrepreneurship involving universities has been a topic fast growing in focus. Building on a model of entrepreneurship proposed by Louis et al. (1989), Jones-Evans (1998) described six ‘types’ of entrepreneurial activities for academics including contract research and consultancy focused on applied R&D, as well as the campus company, the department-led spin-off and the ‘individual spin-off’, which all involve the creation of a company. As can be observed, the focus of entrepreneurship involving universities focuses on the more commercial forms of interaction between university and business: collaboration in R&D, commercialisation of R&D results and entrepreneurship.

Traditionally, studies into collaboration of how university collaborates with business have focused on these entrepreneurial forms of cooperation (Bekkers and Bodas Freitas, 2008; Steenhuis and De Bruijn, 2002). However, in the last few years, the forms of UBC cooperation recognised in literature have broadened, as was captured in a study into the state of European UBC conducted in 2011 for the European Commission. The study identifying eight forms of UBC including: collaboration in R&D, academic mobility, student mobility, commercialisation of R&D results, curriculum development and delivery, lifelong learning, entrepreneurship and governance (Davey et al., 2011).
Building on the work of Davey et al. (2011) is an approach by Wakkee et al. (2013) in which they identified ways in which knowledge ‘valorisatie’ (valorisation) occurs between the university and external stakeholders. Identifying that the forms of cooperation nominated in the State of UBC study could occur also with other public and societal stakeholders (not just business), the study identified two addition forms of external collaboration: resource (facilities, equipment and data) sharing and popularisation of science in the media to expand beyond the UBC forms.1

This means that ten different forms of will be the basis for the review: cooperation R&D, commercialisation of R&D results, entrepreneurship, academic mobility, student mobility, curriculum development and delivery, lifelong learning, governance, resource sharing and popularisation of science.

2.6 Nature of the interaction

In describing how universities contribute more specifically to society through the third mission, a number of conceptual processes have been established which help to clarify how universities deliver value to stakeholders and include transfer, exchange and valorisation. These processes try to capture the way in which objects of value, such as knowledge, capabilities or technologies, are transmitted or exchanged across organisational boundaries. A description of these processes provides valuable and specific insights in the way that universities contribute to society through the third mission.

In an evolutionary sense, there has been a shift in focus in how universities engaged externally. Following WWII (technology) transfer was the first of these processes to be recognised in literature, the concept of (knowledge) transfer evolving in the 1990s and (knowledge) exchange became a more accepted term in the 2000s, whilst valorisation is the most modern process. This shift in focus by literature and practitioners mirrors the shift from mode 1 knowledge production, a linear model of technology and knowledge transfer, to mode 2 processes, which are ‘characterised by nonlinearity, trans-disciplinarily and co-production by heterogeneous groups’ built through exchange [Swan et al., (2010), p.1311; Gibbons et al., 1994].

One of the original tenets of technology and knowledge transfer was the concept that the modality of transfer was primarily one-directional, from public research to industry, moving the innovation from the point of creation to the point of operation (Guerin, 1999).

Knowledge exchange has emerged as a term that captures the growing evidence that the successful uptake of knowledge, often communicated tacitly, requires more than one-way communication, instead requiring genuine interaction among researchers, decision makers, markets and other stakeholders (Lavis et al., 2003).

The emerging concept of valorisation has been captured in Dutch law for universities as a term that represents the notion of a university’s ‘third mission’ to provide service to the community, in addition to education and research. Valorisation recognises co-production of knowledge with non-academic groups, and thereby, the importance of a valorisation system whereby tacit knowledge through interactions can more easily flow (Van Geenhuizen, 2010).

The following section introduces the different conceptual frameworks describing the university’s third mission.
3 Conceptual frameworks related to the university’s third mission

These models were selected for this conceptual paper about how universities contribute through the third mission based upon the central role that they have given to universities and their engagement with external stakeholders.

3.1 Regional innovation system

The literature on the RIS is a derivative of national innovation system literature and inspired by the work of Freeman (1987), Lundvall (1988, 1992), and Nelson (1993). It grew out of the need to better explain how innovation systems operate and develop at a supra-national, national or sub-national level (Gunasekara, 2006) in order to affect the creation, development, and diffusion of innovations (Mowery and Sampat, 2004). Since its inception, the RIS literature has continued to grow in part owing to its convenient alignment with governmental policy levels (supranational, national, regional, local) as well as the growing importance of the regional specialisation, including region clusters, networks and tacit knowledge transfer (Gunasekara, 2006) and the growing recognition of regional innovation value chains (Chatterton and Goddard, 2000).

The concept of the RIS was the first system that meaningfully brought the university to the table in discussions about regional economic development and placed the university in a more prominent role (Gunasekara, 2006), although the state and industry still were still the primary institutional bodies (Etzkowitz, 2002a; Etzkowitz and Leydesdorff, 1999). There is some evidence that RIS has played a role in inspiring the development of the triple helix and engaged universities concepts (Caniëls and Van den Bosch, 2011).

With inspiration from successful regions such as Silicon Valley and Route 128 in the USA, and Cambridge in the UK, RIS takes the perspective that global competitiveness is an issue most-understandably addressed at a regional level (Laukkanen, 2003). At the centre of discussions around RIS is the principal of proximity (Abramo et al., 2012) and its importance in building a regional capability over institutional innovation.

RIS has been described as “a collective order based on micro-constitutional regulation conditioned by trust, reliability, exchange and cooperative interaction” within a demarcated geographical area [Cooke and Morgan, (1998), p.15]. The focus of RIS literature has changed away from localised individuals and organisations and shifted the focus to regional networks and systems (Gunasekara, 2006) and developers of human capital, knowledge and technology fused with users (Boucher et al., 2003; Keane and Allison, 1999).

The RIS system is comprised of a synergetic and efficient virtuous cycle of learning, value creation and improvement with contributions from actors, networks, and intermediaries or facilitators (Caniëls and Van den Bosch, 2011). Literature recognises a number of key capitals that comprise a RIS, including the presence of network/social capital, spatial agglomeration of actors, most commonly in a geographical space, (complementary) industry; relevant contiguous capital human and economic capital; strategic capital through an associative governance administration; and cultural capital through the development of cultural norms of openness which involve mutual benefit, trust and cooperation (Cooke, 2002; Lundvall and Johnson, 1994).
Within the prevailing perspective is of the region, there are varied actors in the RIS including companies (large, medium, small) as suppliers and producers, universities, research institutions, intermediaries and governing actors (Caniëls and Van den Bosch, 2011). According to the literature, the university can contribute to regional development involving its first and second mission: research (through commercialisation of the research) and education (through lifelong learning and training/education designed with business).

Likewise, the university contributes specifically through its third mission, by having active collaboration, in many different forms, with regional (public/private) actors. This is particularly true of its relations business, with focus on commercialisation of R&D, entrepreneurship, governance and shared facilities and equipment, occurring predominantly at the regional level (Caniëls and Van den Bosch, 2011).

In this sense, RIS envisages a holistic set of regional interactions with universities interactions with regional business as a central, but not sole, tenet, through a broad set of cooperation mechanism. RIS are complex environments, having multiple players in networks with a range of skills, competencies and experiences, with an intricate set of relationships and roles in the process of knowledge generation, diffusion and valorisation (Van Looy et al., 2004). For this reason, it can be said that the RIS model envisages a full range of interactions between the university and its external stakeholders, primarily consisting of business and focussed on innovation, in a mutual exchange of value.

In a well-functioning RIS, the university is but one, albeit important, actor and their relationship with business across the three missions crucial for future economic progress. From a stakeholder theory perspective, the RIS framework outlines the desired roles of each of the players in a functioning RIS and their connections. However, without exploring the interests of each of the stakeholder groups, the framework falls short both theoretically and practically in having a deep understanding of direct and indirect stakeholder interests for proper stakeholder management.

- **Stakeholders involved**: Government, region, business and universities.
- **Primary stakeholder perspective**: Region.
- **Focus on forms of external interaction**: Primarily UBC form of interaction (eight forms).
- **Nature of interaction**: Multilateral, co-development of knowledge, people and technologies.

### 3.2 Triple helix

Grounded in the historic development of US universities, the triple helix of government, university and business was first mentioned by Etzkowitz and Leydesdorff (1995) as the predominant way to foster innovation and economic progress (D’Este and Perkmann, 2011). The concept grew out of the need to describe the emerging contextual framework in which universities operated with government and business to create value and the emergence of this new entrepreneurial role being assumed by universities within an increasingly nonlinear and interactive innovation process (Etzkowitz and Leydesdorff, 2000).

Prior to the development of the triple helix framework, the government was seen to have primacy as first initiator of research and regulator of the ‘rules of the game’,
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industry responsible for transfer and commercialisation of knowledge and university as a source of knowledge and developer of human capital through education (Etzkowitz et al., 2000). The three actors operated in isolation and interacted across strongly defended boundaries, with universities, and therefore UBC, generally seen as subservient to, and separated from, government-industry relations (Dzisah and Etzkowitz, 2008). The triple helix has been important in reframing the importance of universities and its success and growth in use can be attributed to its success in providing a clear structure for these stakeholder relationships, in the new knowledge economy.

The triple-helix proposed a ‘new position of the university’, one in which it has an expanded and at least equal footing with government and industry in creating and leading the knowledge society, with public-private relationships playing a primary role in improving national wellbeing (Abramo et al., 2012). The university’s role was moved beyond the traditional roles of research and teaching, with a ‘third mission’ consisting of commercialisation of research competencies, capacities and results most commonly with business (Shane, 2004) with an increased focus on university and academic entrepreneurship through spin-out companies (Etzkowitz et al., 2000), much in the image of the entrepreneurial university.

In terms of the relationships between the three actors, the triple helix suggests a blurring of the boundaries of the traditional roles of the triple helix actors with each taking the role of the other and operating in a “hybrid, recursive and cross-institutional nature of relations” [Gunasekara, (2006), p.141] during the innovation and industrial policy-making processes. It hypothesises a nonlinear interactive approach to innovation in which interactions between universities, industry and government lead to innovation processes that involve benefits for all actors (Caniëls and Van den Bosch, 2011). Sharing of roles, knowledge, resources and infrastructure and equipment multiplication of resources and capital formation projects (Etzkowitz, 2002b) between the three actors is a further aspect of the triple helix.

However, most of the triple helix literature has focused on ‘economic’ (or ‘hard’) and formal UBC forms such as research collaboration, entrepreneurship and commercialisation (Plewa et al., 2006) with limited focus on cooperation in a broader range of (‘soft’) less-formal cooperation activities including mobility, governance and lifelong learning, although it is implied.

A key strength of the triple-helix is its clear communication of stakeholders involved in producing innovation, simply captured in the following: “The nation that fosters an infrastructure of linkages among and between firms, universities and government gains competitive advance through quicker information diffusion and product deployment” (US Council on Competitiveness, 1998). From a stakeholder perspective, whilst it identifies the traditional and new roles of the various stakeholders, it lacks an operative standpoint of how these roles should be assumed by different players.

- **Stakeholders involved**: Government, business and universities.
- **Primary stakeholder perspective**: Society.
- **Focus on forms of external interaction**: Whilst there is consideration of the eight forms of UBC, there is an emphasis on ‘hard’ commercial forms of interaction such as cooperative R&D, commercialisation of R&D and entrepreneurship (3).
• **Nature of interaction**: Symbiotic relationship of exchange with an emphasis on the university as the source of knowledge and technologies, which are transferred to other stakeholders.

### 3.3 Entrepreneurial universities

The concept of the entrepreneurial universities was first published by Henry Etzkowitz in 1983 in a paper reviewing the growing prevalence of academics commercialising their research in the wake of the Bayh Dole Act. The term was used to describe universities that had become critical to regional development (Woollard et al., 2007), and has been subsequently used by policy makers, academics and practitioners to describe those universities succeeding in their ‘third mission’ (Clark, 1998; Lambert, 2003) or the capitalisation of knowledge. Perhaps unsurprisingly given the commonality of the author of both concepts, the *entrepreneurial university* closely aligns with the *triple helix* concept. The *entrepreneurial university* framework describes the role of the university within the context of the triple helix.

In the 1990s, mirroring the growth in recognition of entrepreneurship as its vital role in economic development (Gibb and Hannon, 2006; Van Looy et al., 2004), the *entrepreneurial university* conceptual framework grew in prominence (Clark, 1998). The concept takes the perspective of the university and its central role in policy for building primarily economic competitiveness (Etzkowitz and Leydesdorff, 2000), of a society with specific focus on entrepreneurship (or enterprise) (Rothaermel et al., 2007). It addresses the need to provide individuals with their own entrepreneurial capabilities, as well as to design organisations that will support entrepreneurial behaviour to ensure capability to adapt and thrive in rapidly changing environments (Gibb and Hannon, 2006).

Academics, business, government and ‘society’ are closely tied to the *entrepreneurial university* concept though the university remains the overriding focus. The historical importance of the *entrepreneurial university* concept is that it facilitated a change in the way in which universities viewed themselves, from research-focused ‘ivory towers’ (Etzkowitz et al., 2000), to a more prominent role in contributing to society including the activities considered to be part of that role (Gibb and Hannon, 2006). The role of the *entrepreneurial university* is executed through the movement of the university from being solely responsible to the political system, wherein universities are autonomous and responsible to society. Instead, universities move to the political/economic sphere whereby universities are responsible to society and business, are expected to become more accountable to business interests and to become self-sustainable through the commercialisation of their knowledge (Goldstein, 2008).

The notion of the *entrepreneurial university* framework is that is it heavily focussed on how the university can contribute through economic development. It embraces the notion of a university becoming self-sustainable through commercialising its knowledge for profit (Goldstein, 2008) and having a culture of entrepreneurship (Gibb et al., 2012). The *entrepreneurial university* concept is executed through the mastery of a number of entrepreneurial areas:

1. the development of entrepreneurial academics with a institutionalisation of the creation of spin-out companies which provides local income and employment (Van Looy et al., 2004)
2. the creation of ‘economically-relevant research’ (Etzkowitz, 2001)
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3 academic-industry linkages embraced by academics (Etzkowitz, 2001; Rothaermel et al., 2007; Van Looy et al., 2004)
4 more intense development and commercialisation of new technologies (Van Looy et al., 2004)
5 entrepreneurial education to students and/or academics (Herrmann, 2008)
6 internationalisation and external stakeholder engagement (Gibb and Hannon, 2006).

Literature on the entrepreneurial university recognises the importance of UBC by elevating the importance of cooperative R&D, commercialisation of R&D, and entrepreneurial new spin-offs however it also includes innovative approaches to the execution of teaching as well as research (Etzkowitz et al., 2000) stakeholder engagement (Gibb, 2012) and new institutional forms (Gibb, 2012), though these forms are not as prominent.

The measure of the success of a true entrepreneurial university is said to be in the extent to which the university can connect with the broader market of society and business (Ortmans, 2010) whilst maintaining the quality of research and teaching, and not perceiving it as a significant threat to academic values (Clark, 2004). Essentially, the entrepreneurial university is assessed against how successful it is in integrating into a regional innovation chain, with particular focus on business (Etzkowitz and Leydesdorff, 2000), and its ability to create value for stakeholders (Storm, 2008).

- Stakeholders involved: Government, business and university.
- Primary stakeholder perspective: University.
- Focus on forms of external interaction: Whilst there is consideration of the eight forms of UBC, there is an emphasis on the university’s ‘hard’ commercial forms of interaction such as cooperative R&D, commercialisation of R&D and entrepreneurship (3).
- Nature of interaction: Symbiotic relationship of exchange with an emphasis on the university as the source of knowledge and technologies, which are transferred to other stakeholders.

3.4 Engaged university

The engaged university literature focuses on the university’s engaged, responsive and developmental role in meeting the needs of society and contributing to economic development in a ‘learning’ region (Gunasekara, 2006). The origin of the term is not absolutely clear with the concept being traced back to the last half of the 19th century in the US with the land-grant universities (Goldstein, 2008). The principles of the concept were developed in a series of commissions organised by the US National Association of State Universities and Land Grant Colleges in the 1990s, the expression first promoted by the OECD (1997), whilst Goddard and Chatterton, and Ernest Boyle, ex-Director of the Carnegie Foundation, have also been given some credit for the concept’s development. The engaged university most closely aligns with the RIS view of economic advancement, with the engaged university being the role designated for the university in the RIS.
The concept was established with the aim to better prepare universities to meet societal needs and economic conditions. It has grown because it provides universities with a framework and resources for regionally-connected execution of the university’s third mission, with focus on forms of collaboration involving teaching and research, although academic entrepreneurship is said to be a key element (Caniëls and Van den Bosch 2011). In identifying that universities have a role in regional social, political and cultural life, Goddard (1997) identifies the impact that universities can have on lifelong learning, community development and integration of the region in the international society.

Unlike in the triple helix concept, the engaged university does not concern itself with the university’s influence relative to government and business. Instead it focuses on the constant need to exchange knowledge between regional actors, and the university role in this system (Gunasekara, 2006) is a balance between a driving and supporting actor in its region. For this reason, it more closely aligns itself with the RIS literature. Furthermore, it acknowledges that in a constantly changing world, there is a need to develop an exchange of knowledge, competencies and information as well as technologies to promote regional competitiveness. Within this, universities are seen to have a leading, active and initiating role in regional development (Caniëls and Van den Bosch, 2011).

The concept embraces a regionally-connected execution of the university’s first two missions which requires a longer-term vision, relationship-building, interaction and understanding between regional actors, as a means for executing its ‘third mission’ (Caniëls and Van den Bosch, 2011). It also favours a more regional focus for the execution of the third mission, with particular reference to academic entrepreneurship, rather than actions that generate a more rapid financial return on investment but may not provide benefits to all stakeholders (Gunasekara, 2006), a criticism of the triple helix and entrepreneurial university concepts. For this reason, UBC is not the prime focus of the engaged university, rather it is one of a number of cooperation forms between stakeholders that occur and that a complete valorisation of university takes place through mutual development.

In a review of the characteristics of engaged university, Ramaley (2005) identified nine characteristics which highlight the community focus of the engaged university including: civic engagement recognised at a strategic level, the university engages the community in continuous and purposeful ways, a curriculum that engages students in community concerns, the university considers the community in its actions, appropriate mechanisms are in place to promote, reward and support community development, a culture of engagement exists with individual empowerment, interdisciplinary work, visibility of engagement internally and externally, evaluation of engagement efforts. The nine characteristics provide principles for defining as engaged university.

The successful execution of the engaged university concept involves resources and knowledge of a university, partnered with the public and private spheres. It does this in order to enhance scholarship, research, improve curriculum development and delivery, improve employability, prepare educated and engaged graduates, strengthen civic and democratic values as well as address societal issues, improve social cohesion and contribute to the public good (CIC Committee on Engagement, 2005).

From all the different frameworks described, the engaged university framework considers most thoroughly the needs of stakeholders within the education and humans resource development value chains.
Converting university knowledge into value

• **Stakeholders involved:** Government, region/society, business and universities.
• **Primary stakeholder perspective:** University.
• **Focus on forms of external interaction:** All forms of interaction (12 forms) although with a focus on forms of collaboration involving teaching and research.
• **Nature of interaction:** Multilateral, co-development of knowledge, people and technologies.

3.5 Related conceptual models

Whilst not predominantly referenced in scientific literature in discussions about the university’s third mission, a number of conceptual models have emerged in the last 15 years which also add to this discussion including open innovation, the quadruple helix and academic capitalism.

3.5.1 Open innovation

Chesbrough (2003) identified the concept of open innovation after observing that in response to increasingly global competition, shorter products/service life cycles (Cooper, 1993), and continually changing customer needs (Gummesson, 2002; Santoro and Chakrabarti, 2002), a growing phenomenon in innovation strategies of a number of large high technology industries was emerging (Chesbrough and Kardon Crowther, 2006). The concept looks at the process of converting knowledge, technology and research inputs into economic value and competitive advantage, like the RIS concept, however, open innovation is primarily a framework that takes the perspective of the business.

The open innovation concept proposes an innovation process that is open (from the firm’s perspective), rather than closed (Chesbrough and Kardon Crowther, 2006), incorporating “external ideas as well as internal ideas, and both external and internal pathways to market” [Chesbrough, (2003), p.24]. This necessitates interaction between different actors (Caniëls and Van den Bosch, 2011) including university and business. With companies having been forced to open their research and innovation processes (Chesbrough, 2003), R&D collaboration, alliances and partnerships with universities have been increasingly embraced as a means for improving innovation (Autio, 1997). Nowadays, dynamic ‘systems of innovation’ exist, which involve complex collaborations amongst various actors including research groups across national borders, who combine their research efforts (OECD, 2003).

Other research-related cooperation between university and business takes place through the sharing of complementary resources/capabilities, through knowledge-sharing routines (Dyer and Singh, 1998) as well as cost-sharing (Ziss, 1994), and through complementary knowledge acquisition (Brockhoff et al., 1991). Whilst not always explicitly addressed in open innovation literature, universities have a substantial role in educating and developing the human capital that research, create, develop and manage the ideas within business (League of European Universities, 2006; Schartinger et al., 2002).
3.5.2 Quadruple helix

Originally described in the 2009 article by Carayannis and Campbell, and building on the triple helix concept, the so-called ‘quadruple helix’ concept embraces ‘civil society’ as a fourth actor (Carayannis and Campbell, 2012). Whereas the triple helix concept focuses itself on how the trilateral actors of government, industry and university combine to produce knowledge and innovate in a ‘knowledge economy’, the quadruple helix takes a broader view by having the ‘knowledge society’ as its lens, acknowledging the role of society as beneficiaries of knowledge. In this way, the quadruple helix recognises that sustainable development of a knowledge society necessitates that triple helix actors have a sort of ‘co-evolution’ with society itself (Carayannis and Campbell, 2012).

3.5.3 Academic capitalism

Though not yet widely embraced by university third mission-related literature, the concept of academic capitalism none-the-less contributes to an understanding of how universities add value through ‘profit-oriented activities’. Aligned with the entrepreneurial university concept, whereby knowledge is seen more as a commodity than a public good, academic capitalism taps into the movement of US universities towards a more commercial orientation linking universities with markets (Slaughter and Rhoades, 2009). The literature on academic capitalism sharpens the focus of the entrepreneurial university literature on primarily commercial profit-focussed terms and more prominently on academic protagonists.

3.5.4 Related processes

Modes 1, 2 and 3 knowledge creation and dispersion as well as technology and knowledge transfer are often named in literature as synonyms for the conceptual frameworks described above. However, given that they describe ‘how’ knowledge is created and dispersed, this author perceives them to be processes or modus operandi of knowledge development as opposed to the above-named conceptual frameworks which identify, ‘what’, ‘to what degree’ it takes place and ‘who’ is involved at a strategic or macro level.

3.6 Framework summary

A summary of the different conceptual frameworks involving universities can be found in Table 2.

A visual summary of the different concepts involving university and business can be found below including a comparison of:

1. the stakeholders involved
2. which stakeholder perspective the framework takes
3. the forms of cooperation/interaction involved
4. the nature of the cooperation/interaction.
<table>
<thead>
<tr>
<th>Concept</th>
<th>Perspective</th>
<th>Primary stakeholder perspective</th>
<th>Stakeholders involved</th>
<th>Focus on forms of cooperation</th>
<th>Direction and nature of interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional innovation system</td>
<td>Takes the perspective of the region to explain how an innovation system exists within a regional context involving multiple actors/networks. A crucial component in RIS is the university, with the role of regional system builders and regional innovativeness. Entrepreneurship at the university is a significant part of how the university contributes to the region.</td>
<td>Region</td>
<td>Government, university, business, region</td>
<td>(8) Collaboration in R&amp;D, commercialisation, entrepreneurship, governance, student mobility, academic mobility, LLL and curriculum development and delivery</td>
<td>Multilateral, co-development of knowledge, people and technologies through valorisation.</td>
</tr>
<tr>
<td>Triple helix</td>
<td>Takes a ‘birds-eye perspective of the relations between government, business and universities and their relationship as hybrid, recursive and cross-institutional. It points to the underutilised capacity of universities to contribute to regional innovation and aligns with the concept of the entrepreneurial university. Places university entrepreneurship as a central part of the framework.</td>
<td>Society</td>
<td>Government, university, business</td>
<td>(3) Collaboration in R&amp;D, commercialisation, entrepreneurship.</td>
<td>Symbiotic relationship of exchange, university as the source and transferor of knowledge and technologies.</td>
</tr>
<tr>
<td>Entrepreneurial university</td>
<td>Embraces the notion of a university becoming self-sustainable and having a culture of entrepreneurship. The framework outlines the university role as being entrepreneurial, with entrepreneurial activity a core element. The framework (from the perspective of the university) aligns with the triple helix framework (regional perspective).</td>
<td>University</td>
<td>Government, university, business</td>
<td>(3) Collaboration in R&amp;D, commercialisation, entrepreneurship.</td>
<td>Symbiotic relationship of exchange, university as the source and transferor of knowledge and technologies.</td>
</tr>
<tr>
<td>Engaged university</td>
<td>Takes the perspective of the university and its active role in the regional development. In this way, it outlines how the university contributes to regional objectives in a holistic way, more broadly than through cooperation with business or through entrepreneurial activity. The framework (from the perspective of the university) aligns with RIS framework (regional perspective).</td>
<td>University</td>
<td>Government, university, business, society</td>
<td>(10) Collaboration in R&amp;D, commercialisation, entrepreneurship, governance, student mobility, academic mobility, LLL, curriculum development and delivery, resource sharing, popularisation of science.</td>
<td>Multilateral, co-development of knowledge, people and technologies through valorisation.</td>
</tr>
</tbody>
</table>
4 Discussion and conclusion

4.1 Comparing the frameworks

In addressing the primary research question, each of the conceptual frameworks named provide a pivotal contribution to discussions about the third mission role of the university and how the university interacts with society. The conceptual frameworks discuss how universities contribute to economic development and processes of knowledge-based economies, including the creation and usage of new knowledge and technologies and the development of competent human capital. All conceptual frameworks perceive universities to have a varying degree of influence depending on the perspective, with two specifically focussed on the university and its role.

The similarities between the models provide an important contribution as they reinforce the notion that “science and technology increasingly appear as a main source of competitive and sustainable advantage for nations and regions alike” [Carayannis and Campbell, (2012), p.2]. Given that the factors of production include land, labour, resources and human capital/enterprise, with ‘land’ supply fixed and a limited amount of ‘resources’ available, societal development is no longer reliant on the quantity of these
inputs, but rather on how we best use these limited capitals in combination to create value. In this context, the development of more capable humans (labour), better resources and particularly greater enterprise highlight the essential nature of universities in future progress of our societies.

As a means for teasing out their differences, Steurer (2006) nominates three different perspectives of stakeholder theory which address business-society relations:

1. corporate
2. stakeholder
3. the conceptual perspectives.

The conceptual frameworks named in this paper have taken one of the stakeholders’ perspectives. The literature on the entrepreneurial university applies a university (‘stakeholder’) lens to cooperation and RIS looks at cooperation from more of a societal (‘conceptual’) perspective. In their description of the triple-helix of government, business and university, Etzkowitz and Leydesdorff (1999, 2000) also use a ‘conceptual’ (birds-eye) stakeholder perspective in describing the benefits for society from their interaction, cooperation and integration, however, do not focus directly on outcomes and impacts for stakeholders, instead for society.

Furthermore, and potentially as a result, each views the role of the university and its third mission in a different way, or with a different focus. By reviewing the frameworks through the lens of the different types of collaboration, it can be observed that each framework embraces different forms of cooperation and therefore become a differentiating factor between the frameworks. This clarity enriches not only the understanding of each of the frameworks, but also their contribution to theory and the university’s role. This constitutes an additional contribution made by the frameworks as they highlight different stakeholders and their role within an innovation system, with particular focus on the university.

Critically, all frameworks adopt the multilateral exchange embodied in mode 2 innovation processes, embracing the concept of knowledge transfer and exchange, rather than solely a unidirectional transfer as seen in mode 1, although admittedly to varying degrees.

When comparing the literature of the triple helix and RIS, RIS has a specific focus on the way in which universities can provide regional impact through governance and lifelong learning as well as teaching cooperation in addition to more commercial forms of cooperation. Furthermore, RIS focuses to a lesser degree on a university’s entrepreneurship impact through the commercialisation of university technology and knowledge and more on how the university comments into the regional innovation chain. This regional, rather than private commercial focus, lends itself to outreach activities focussing co-development in research and education with the benefits of improvements to impact within the region. For this reason, it could also be argued that the RIS literature basis itself to a greater degree on systems theory whilst the triple/quadruple helix concept takes more of traditional stakeholder theory or institutional theory.

In comparing primary differences between the two university-perspective frameworks, the engaged and entrepreneurial university, there have been a number of specific areas identified within the paper. However, a crucial difference taken by the engaged university framework is how the concept views knowledge. The engaged
university concept sees knowledge more as a ‘public good’, whilst the entrepreneurial university framework views ‘knowledge as a commodity’ for use in university revenue raising (Goldstein, 2008). This is a critical point of departure between the two concepts and underpins their disparate philosophies on how the universities contribute through its third mission outreach.

Moreover, the nature of the conceptual framework adopted can also stem from a number of influencing factors. The entrepreneurial university seeks financial remuneration for its outreach activities, which could be as an attempt to overcome reduced funding, like universities in the UK which did not obtain the same degree of public funding as their European-mainland counterparts and thus, according to Mowery and Rosenberg (1999) were forced to be more ‘entrepreneurial’ in responding to changing socio-economic needs (OECD, 2002).

A further finding is that there is a natural alignment of the models with each other. Given the higher regional focus of the RIS and engaged university frameworks as well as the commercial focus of the triple helix and entrepreneurial university frameworks, they tend to work together in providing a fuller perspective of the university’s role in the knowledge society as well as how it executes its third mission. For example, where the RIS framework takes the perspective of society to provide a macro framework for the economic development involving universities, the engaged university provides a perspective as to the role of the university in that RIS construct. Similarly, the triple (quadruple) helix provides the macro perspective in which the entrepreneurial university resides.

Further differences in the frameworks relate to perception that system theory aligns with the RIS and engaged university frameworks to a greater degree. Utilising systems theory applied to clusters, Carayannis and Campbell (2012) nominate three forms of clusters:

1. ‘geographic, spatial-political clusters’ which are primarily of a geographical nature
2. ‘sectoral clusters’ which are aligned with industries or business sectors
3. ‘knowledge clusters’ relates to a specific area of knowledge and have a geographic or sectoral nature.

Applying this to the conceptual frameworks, ‘geographic, spatial-political’ clusters tend to dominate the RIS/engaged university frameworks whilst the ‘sectoral clusters’, not necessarily geographic, tend to dominate the triple helix/entrepreneurial university concepts (see Carayannis and Campbell, 2006). Both possess the ability to possess a ‘knowledge clusters’ which cuts across different geographic locations and sectors, thus operating globally.

For the reason described above, the focus of the different concepts on entrepreneurship and UBC versus a broader and multi-faceted engagement with society are also central to their differences. The triple helix/entrepreneurial university literature tends to focus more prominently on explicit (and commercialisable) forms of knowledge transfer whilst the RIS/engaged university literature is more focussed on identifying both explicit and tacit forms of knowledge transfer. Acknowledging tacit forms of knowledge transfer to a greater degree, RIS/engaged university literature tends to emphasise relational knowledge exchange between the university and business actors rather that transactional knowledge transfer from the university to industry.
Because of these differences, the understanding of what constitutes the third mission activities is actually broader and more holistic in RIS/engaged university’s in comparison to the triple helix/entrepreneurial university, which is more economically focussed through commercialisation of research and creation of new enterprise (Goldstein, 2008; Gunasekara, 2006).

This discussion points to the strength and weaknesses of both.

The RIS framework contributes more to a ‘softer’ form of external engagement based upon relationships and regionally embedded interaction. These forms of interaction, many of a tacit nature, are however traditionally difficult to capture or quantify and therefore manage and may not result in substantial direct contribution of finances.

The greater financial focus of the triple helix/entrepreneurial university frameworks makes it easier to measure external engagement and support as well as makes it a more promotable approach. However, the frameworks can meet resistance within the university, especially in the utilisation of the term 'entrepreneurship, as “to some faculty, the adjective ‘entrepreneurial’ manifests an objectionable vision of a non-academic, profit-driven business firm that is uninterested in the traditional academic verities” [Fisher and Koch, (2004), p.23]. This may prove to be a substantial disadvantage to its use in many universities.

A disadvantage for the use of the conceptual models is that the frameworks have neither detailed operational nor strategic details which make them ready-made guides for implementation in the university context.

4.2 Meaning for European universities

As described in the historical development of the university missions, different evolutionary paths for the university can be observed between the US and Europe, with the US generally being documented as ‘early-movers’ in universities engaging with their environment as well as UBC (Hall et al., 2001; Etzkowitz, 2001). Differences are not documented just in terms the development rates, but also in the way that collaboration has developed in the US as compared to Europe. US collaboration has historically favoured a more commercial path, seeing knowledge as a commodity commercialised through patents, licences and spin-outs, whereas the European ‘learning model’ has focussed to a greater degree on applying new technology to existing businesses [Etzkowitz et al., (2001), p.26] whereby knowledge is seen more as a public good than commodity.

This historical development of universities in Europe highlights that European universities and academics may have resistance to the frameworks more obviously focussed on commercial outcomes, such as the triple helix or entrepreneurial university frameworks.

Additionally, the nature and source of funding for universities and whether the institution is public or private will likely influence the conceptual framework chosen by respective European institutions. Given that Europe is characterised by a high number and prominence of public universities, no or low students’ fees for education with tuition fees being set by the national government (Jongbloed, 2008), meaning universities largely rely on public funding in Europe (Hoareau et al., 2012), further suggests that frameworks for the third mission that embrace societal and regional impact are more likely to be adopted. This is because there is less pressure to generate finances and a
greater likelihood that regional governments and societies demand a higher contribution to the society that funds them.

These fundamentals suggest that in a European context, the RIS and engaged university frameworks are more likely to be embraced as a means for delivering on the university’s third mission and generating a positive societal impact.

4.3 Conclusions and managerial implications

This paper sought to provide a discussion about this broader role of universities in society bringing in to focus the ‘dispute’ between the different theoretical and conceptual frameworks as they relate to the university’s third mission. The results showed clearly the overlaps and respective foci of the different conceptual frameworks, enriching the discussion about how the university contributes through its third mission. Furthermore, review showed that the frameworks look at the same phenomenon from different stakeholder perspectives and with different views on the role of the university within them.

Resultantly, whether theoretically, politically or operationally, it is crucial to understand the framework from which the role of the university is viewed, because each sees the role of the university, slightly differently. Having a common understanding, or at least an understanding the different standpoints, allows policy makers and university managers to more ably approach the task of the third mission in a way that fits the needs of the university and its environment.

A further contribution to policy-makers, practitioners and research alike is to provide a clearer understanding of how universities and external stakeholders cooperate and interact to undertake technology or knowledge transfer or indeed valorisation of university knowledge. By clarifying the different concepts in relation to the university, policy-makers can improve, and provide more focussed, decision making, whilst practitioners can benefit from a more strategic macro perspective of how their actions to support or drive the university’s third mission will be understood by, and affect various stakeholders. In an operational sense, the frameworks offer differing paths to what Clark describes as that strongly-desired high degree of market control (Clark, 2004) and sees as a response to the growing demands of the 21st century (Clark, 1998).

Furthermore, for university managers generally it highlights the importance of the public or private status of your institution as well as the source and extent of reliance on funding sources and particularly the historical development of your institution and universities in your country, as influencing factors for the conceptual frameworks chosen in executing the third mission. The analysis suggests that European university managers will therefore tend to have greater success in implementing RIS/engaged university frameworks over triple helix/entrepreneurial university frameworks, with an exception potentially in the UK owing to their greater reliance on non-government funding.

For academics, this paper provides a clear and firm platform upon which to research topics related to innovation, entrepreneurship, engagement, UBC or valorisation involving universities. Further research could be focussed on empirical studies investigating how these conceptual frameworks are applied by practitioners and as a means for developing knowledge bases for the above mentioned topics which involve universities.
4.4 The opportunity for (European) universities

History shows that development of the university and its role has closely mirrored the development of society; from the first mission of education, an expanded educational gambit and a new role of research was added during the industrial revolution. In the last 30 years, the forces of globalisation and new platform technologies such as the internet (Friedman, 2005) has forced society into an incredible rate of change with innovation cycles decreasing (Kurzweil, 2004) and the business institution, and society more generally, both facing great competition and transformation. Given this scenario, it seems inevitable that universities are set to (or have already) encounter a comparable need to react to the fast changing circumstance. As world economies still suffering from the 2007 economic crises face new fears that the economic crisis might deepen (Doward et al., 2016), change may be forced upon universities.

In this context, there is a broadening expectation, if not an already strong need, to find ways for universities to deliver greater society impact through more active involvement in the society, with business as a major proxy for society. Arguments that university needs to stay independent were true at a time when a more limited number of graduates, primarily the elite, emerged from universities. However, given the large number of tertiary graduates (creeping up to 40% of the population aged 30–34 in Europe; Eurostat, 2015), independence for all institutions and in all situations is simply not affordable.

It is obvious that a new paradigm is at play that needs to be acknowledged and embraced by university management. This is because, akin to when key buy-in from film industry to a self-imposed rating system for films (the Hays Code) appeased societal pressure and strengthened their standing in the community (Blomquist and Lehrer, 2007), there is an opportunity for universities to proactively set its own standards for engaging with society through the third mission, rather than have them imposed. Within this context, the conceptual frameworks in this paper provide essential reading for university managers and potentially provide a map for the design of third mission activities for universities.

References


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Notes

1 It can be observed that some of the forms of interaction involve the first two university missions of education and research, however this paper takes the view that these activities described are consistent with the concept of the third mission as they are specific externally-focused cooperation and outreach activities rather than activities internally focussed on students or involving academics (albeit perhaps external academics who are still ‘internal’ to the university system).

2 Although, taking the view that knowledge is a ‘public good’ has been found to result in a slower diffusion of knowledge and lower rates of technological adoption (Litan et al., 2007).