Welcome to Manchester for the XVI Triple Helix Conference 2018. Across the world, states and city regions are facing huge societal, economic, environmental, and political challenges whose solutions require concerted new efforts and innovative partnerships. The 2018 International Triple Helix Conference brings together academia, government, business, and community to share effective practices and to advance the frontiers of knowledge about collaboration for economic progress, social development and sustainability, and the role of cities and regions as enabling spaces for these interactions.

Book of Abstracts
Table of contents:

Conference panels and roundtables ................................................................. 3
Paper abstracts ................................................................................................. 21
Poster abstracts ............................................................................................... 188
Index .................................................................................................................. 206

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The Manchester Institute of Innovation Research is a centre of excellence in the field of innovation studies. With 40 members, approximately 50 PhD researchers, and many associated academics, we are Europe’s largest - and one of the world’s leading research centres in our field.

With a heritage of over 50 years of science and innovation policy research and management at the University of Manchester, and a rich legacy of looking into the relationship between academia, business and policy, we are delighted to support the XVI Triple Helix Conference in Manchester 2018.

http://www.research.mbs.ac.uk/innovation
Conference panels and roundtables
The Connected Health Cities method: A cross-sector partnership approach to improving health outcomes

John Ainsworth¹

¹University of Manchester, Manchester, United Kingdom

A Learning Healthcare System is defined, by the Institute of Medicine (IoM), as a system in which, “science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of the delivery experience.” Connected Health Cities (CHC) is a cutting-edge health programme which harnesses the power of data to develop the UK’s first implementation of Learning Health Systems (LHS) by bringing together academics, public sector organisations and industry. This partnership demonstrates a reduced timescale for the production of evidence of efficacy. LHS turn existing and under-used data into actionable intelligence for local NHS and social care providers to drive public sector reform for better health and care. Importantly CHC works in partnership with local citizens to understand what is expected and acceptable when it comes to the use of their data. Testing the level of acceptance by the public, through the use of Citizen Juries, of care pathway projects allows CHC to produce LHS that implement changes that are both wanted and needed by clinical staff and patients to deliver care where and when it is most needed.

CHC is having a measurable impact on healthcare in the UK by applying the LHS methodology to a range of care pathways including alcohol misuse, COPD, childhood obesity, autism, stroke, antimicrobial resistance and antibiotic prescribing, opiate dependency, healthy ageing, supporting community care, unplanned emergency care, and vulnerable families.

This panel will provide a forum for discussing the work of the CHC. Following short introductory presentations a round table discussion will:

- Provide an understanding of how LHS has been implemented across the North of England
- Discuss the benefits and challenges of LHS working across different sectors and governance
- Demonstrate the benefits of working closely with citizens to understand the opportunities and objectives of LHS
- Discuss how the methodology developed can be exported and used in other countries/regions, as well as learn how others are already implementing LHS

Speakers:
- John Ainsworth, University of Manchester, “Learning Health Systems as Engine for Health and Care Improvement”
- Liz Mear, Innovation Agency, “System thinking and planning for alcohol-related disease”
- John Wright, University of Bradford, “Born In Bradford 4 All: Building health avatars for better care”
- Tjeerd van Staa, University of Manchester, “Importance of whole system behaviours and change in preventing anti-microbial resistance”
Innovation ecosystems – Fad or reality?

Catherine Beaudry¹, David Wolfe², Shiri Breznitz²,
¹Polytechnique Montreal, Montreal, Canada, ²University of Toronto, Canada,

Since Moore (1993) conceptualized business ecosystems, a number of scholars have jumped into the ecosystem bandwagon, some from the open innovation point of view, others expanding the notion of clusters and regional systems of innovation and others from the networks and proximity literature. Innovation ecosystems are at the confluence of innovation networks and knowledge clusters, where individuals, organizations, technology are interacting, formally and informally, to “catalyse creativity, trigger invention, and accelerate innovation across scientific and technological disciplines, public and private sectors […] in a top-down, policy-driven as well as bottom-up, entrepreneurship-empowered fashion” (Carayannis & Campbell, 2009:202-203). As such, innovation ecosystems expand the notion of systems of innovation by adding individuals and informal stakeholders (communities) as well as their interactions to the relationships between institutions that characterize the systems of innovation and how they contribute to the innovation trajectory. Yet, innovation ecosystems are used to describe anything and everything nowadays. How different are they from the quadruple helix? We are swimming in a sea of ever increasing nebulous concepts.

This panel will aim to disentangle the various concepts and provide examples of what constitute an innovation ecosystem. Using a closed Fish Bowl discussion, the four panellists will briefly explain their points of view on the question from the perspective of their own research. Each panellist will have about 7-8 minutes to do so, for a total period of 30 minutes. Then, the moderator will challenge and confront their views in order for the group to reach a consensus or not (another 30 minutes). Then the participants will be able to provide support to one or more views to help the panel arrive to an answer about what really constitute an innovation ecosystem and how the triple helix and quadruple helix models have to bring to the discussion.

Keywords: innovation ecosystems, clusters, university, policy, triple helix

Speakers:

- David Wolfe, Innovation Policy Lab, Munk School of Global Affairs, University of Toronto: Digital Clusters or Innovation Ecosystems?
- Shiri M. Breznitz, Innovation Policy Lab, Munk School of Global Affairs, University of Toronto: The University as an Innovation Ecosystem - Can the fish live outside the fish bowl?
- Catherine Beaudry, Department of mathematics and industrial engineering, Polytechnique Montreal (chair)

Health, Innovation and the Economy.
We will present a model in Greater Manchester where the NHS, working with academic partners, industry and the City are creating a vibrant ecosystem that attracts a cluster of start-up, SMEs and larger companies to locate their business here to develop products and services that are better aligned to their target markets as a consequence of multi layered engagement that is facilitated by co-location. Creating the environment and conditions that attract and support business to establish and grow needs aligned actions of multiple partners, over sustained periods.

Speakers:

- Keith Chantler Group Director of Innovation, Manchester University NHS Foundation Trust
- Michael (Mike) Blackburn OBE Chair of the Greater Manchester Local Enterprise Partnership
- Jonathan Burroughs CEO of Creative Places Ltd
- Linda Magee OBE, NHS Investment Specialist (Life Sciences Organisation, Department for International Trade, UK)
Social entrepreneurship and transdisciplinary research: challenges and opportunities of co-developing a gamified digital technology

Paul Dewick

University of Manchester, Manchester, United Kingdom

The panel will offer insights into the problem based beginnings of their transdisciplinary collaboration and the synergistic benefits of combining different knowledge sets, skills and resources. The Chair will moderate a wider discussion around the challenges and opportunities associated with moving from an academic funded research project toward an accelerated route to market and the opportunity to benefit the wider community. The session is intended to be conversational between the panel and the attendees and we look forward to an engaging, interactive session.

Speakers:

- Paul Dewick (Alliance Manchester Business School, The University of Manchester)
- Emma Stanmore (School of Health Sciences, The University of Manchester)
- Ed Cox (Founder of Reason Digital, an award winning social enterprise that uses digital technology to make a difference, working only on projects pursuing social good)
- David Hoyle (Business Development Manager at Jigsaw, one of the largest housing groups in England).
- Chair: Tony Walker, Director of the Innovation Optimiser at The University of Manchester Intellectual Property (UMIP).

Links:

- https://reasondigital.com
- https://www.jigsawhomes.org.uk
- Hoyle, D., (2017), Gamification and reducing risk of STF, Housing Technology, March 2017
Opportunities and challenges in Operationalizing the Triple Helix model at regional level: the experience of the Triple Helix Association Chapters

Maria Laura Fornaci\textsuperscript{1} and Christiane Gebhardt\textsuperscript{2}
\textsuperscript{1}Executive Director at Triple Helix Association, \textsuperscript{2}Malik Institute, Switzerland; Triple Helix Association

This panel session will shed a light on how the Triple Helix model has been routed in different local contexts by the Triple Helix Association Chapters of Brazil, Russia, Greece and South Asia, in order to boost their innovation ecosystem.

Particularly the panel intends to elicit the blockages, break troughs and achievements faced and reached by Chapters in operationalizing the Triple Helix model including the different TH constellation and orchestration put in place, and the expected impact in the long term.

Speakers:

- Chair: Christiane Gebhardt (Malik Institute, Switzerland; Triple Helix Association)
- Panayiotis Ketikidis (University of Sheffield International Faculty, CITY College, Greece); Adrian Solomon, South East European Research Centre (Greece). Leaders of the Greek Chapter.
- Tatiana Pospelova (Stanford University, USA). Leader of the Russian Chapter, hosted by the Lomonosov Moscow State University (Russian Federation)
- Abid Hussain Khan Shirwani (University of Management & Technology, Pakistan). Leader of the South Asian Chapter (SATHA).
- Branca Terra (Rio de Janeiro State University, Brazil). Leader of the Brazilian Chapter
Triple Helix Opening Roundtable Panel: Welcome & Panel: Powering Strategies for Innovation

Chris Fox
\(^1\)  
\(^1\) North West Business Leadership Team (NWBLT), Warrington, United Kingdom

This panel session will look at the strengths of innovation in the North West. Considering the cultural and historical success of the region and also the success of many companies who have chosen the North West of England as their home. It will also consider the academic strength of the region with its world leading universities and how these universities already connect well with regional, national and international business.

The ambitions of the North West will also be a major part of the panel, for example the embracing of digitalisation and the Made Smarter North West pilot of Industry 4.0.

Coordinator: Chris Fox, NWBLT

Speakers:

- David Pinder, CEO, Baxi UK.
- Dean Cook, Head of Regional Engagement, Innovate UK
- Laura Webb, Technology Consulting Lead, Accenture
- Luke Georghiou Deputy Vice Chancellor, University of Manchester
- Susan Smith, Head of Daresbury Laboratory, STFC.
Triple Helix in Rentier Economies: Could Multiplayer Innovation Policy Become a Cure for Dutch Disease?

Alexey Gusev, Alexandra Engovatova, Alexander Kurdin, Samir Mammadov, Ibrahim Jaffri

1Russian Venture Company, Moscow, Russian Federation, 2Moscow State University, Moscow, Russian Federation, 3Baku Engineering University, Baku, Azerbaijan, 4Collaborative Research in Engineering, Science, Technology (CREST, Malaysia)

In the recent years many resource-rich countries have launched special policies aiming to create innovative sectors of economy (see for example Frenkel and Maital, 2014; Kuhlman and Ordonez-Matamoroz, 2017). Generally those countries tend to implement the same policy measures as all the “latecomers” that are trying to catch up the leading innovative economies. However, we observe many social, economic and administrative peculiarities that happen only in the countries with abundance of natural resources.

The issues that would be examined during the panel session are the following:

- What is the rationale behind the “innovation policies” of rentier states? Is it a deep need to diversify national economy or is it a kind of “cargo cult” that only the rentier states are financially capable of imitating?
- What roles do the universities and resource extracting corporations play in this environment? How do those actors adjust agendas and reallocate funds under the imposed framework of “innovative economy development”?
- Is the Triple Helix model applicable for such a specific environment where the majority of changes is initiated by government and face resistance from other players?

The concept of “rentier state” was initially based on evidence from the Arab world (Beblawi and Luciani, 1990) but it definitely explains the same problems of all other resource-rich countries. In this proposed panel session we are focusing on case studies from oil-rich economies such as former USSR countries (Russia, Kazakhstan, Azerbaijan) and Malaysia.

Hopefully, the session would be important for the conference because it examines the “applicability” of the Triple Helix model under very specific conditions. We see it crucial to understand if the Triple Helix model works for the countries where universities and corporations have virtually no incentives to invest in applied RnD.
Highly skilled workers play a central role in both today’s knowledge economy and cross-country labour mobility. The number of international migrants with a tertiary degree has more than doubled from 1990 to 2010, with a percentage increase triple that of low-skill migrants. This migration contributes to knowledge creation in destination countries, as well as to knowledge diffusion worldwide. This is especially true in consideration of the rising importance of short-term and circular migration, fuelled by several migrants’ categories such as students, faculty at universities or executives of multinational enterprises. Amongst these, STEM migrants (those with degrees or jobs in Science, Technology, Engineering & Mathematics) are among the most mobile, and directly contribute to innovation in destination countries, and possibly to knowledge transfer to their countries of origin.

In this panel discussion we will address migration, research and innovation in the context of the triple helix. The overall goal is to explore the experiences of STEM migrants in knowledge diffusion and knowledge creation. Specific topics of discussion include:

1. The role of STEM migration in knowledge diffusion, in relation to physical and cultural distance (between individuals and/or organizations);

2. The role of STEM migration in shaping academic entrepreneurship and university-industry collaboration.

3. The role of organisations in structuring STEM migration flows, and the resulting knowledge flows.

The explicit goal of this panel session is to encourage and strengthen research in this area. A Research Policy Special Issue call is attached to this session with a deadline of 30 September 2018.

Speakers:

- Max Nathan (University of Birmingham) Skilled migration, innovation and urban economies
- Ernest Miguelez (GREThA-Université de Bordeaux) High skilled migrants, diaspora networks, knowledge diffusion and international capital flows.
- Cornelia Lawson (University of Bath) The geography of foreign and native-born academics’ engagement with external actors
- Shiri Breznitz (University of Toronto) Student migration and academic entrepreneurship
How can we best capture universities’ knowledge exchange activities?

Chiara Marzocchi\(^1\), David Charles\(^2\), Fumi Kitagawa\(^3\), Federica Rossi\(^4\), Pablo D’Este\(^5\), Abhijit Sengupta\(^6\)

\(^1\)University of Manchester, \(^2\)Northumbria University, \(^3\)University of Edinburgh, \(^4\)Birkbeck University, \(^5\)Ingenio/CSIC, University of Valencia, \(^6\)University of Essex

Universities interactions with industry and the broader society have gained prominence in the academic and policy discourse, and knowledge exchange (KE) activities of universities are increasingly supported via dedicated government funding, investment in infrastructure and incentives for academics and HEIs.

This expanding KE agenda in policy and academia and recent announcements such as the introduction of the Knowledge Exchange Framework in the UK calls for a renewed discussion about what constitutes KE, what are adequate metrics to capture its performance, how are these translated into incentives (financial or otherwise), and how measurement and performance frameworks may support or hinder these activities. Not everything that counts can be counted, and not everything that can be counted counts, and therefore a narrow focus on output indicators related to commercialisation should be avoided.

This panel aims to assess the relevance of existing practices in the collection of data and in the measurement of KE, and contribute to the development of approaches to measure, assess and promote KE that more accurately reflect the broad nature of the knowledge produced, nurtured and absorbed by HEIs. The panel will address three broad areas related to KE practices and the associated questions and reflections arising from past experiences and challenges for future metric design and implementation.

1. How well are we currently capturing the strength, breadth and depth of the knowledge exchange activities across the university sector?

2. What tensions are likely to emerge from the implementation of a knowledge exchange performance framework and how can they be effectively addressed?

3. How should we design new metrics and systems to identify and assess the impact of universities’ knowledge exchange practices on the wider economy and society?

Speakers:
- David Charles, Northumbria University
- Federica Rossi, Birkbeck University
- Fumi Kitagawa, University of Edinburgh,
- Abhijit Sengupta, University of Essex
- Pablo D’Este, Ingenio, Universidad Politecnica de Valencia
- Chiara Marzocchi (chair)
Making a city smart: Collaboration, evaluation and implementation

Krassimira Paskaleva¹
¹Manchester Institute Of Innovation Research, University of Manchester, Manchester, United Kingdom.

Despite a growing popularity of smart cities and a booming interest by researchers, policy makers and practitioners, the actual performance of smart cities remains an under-researched area. There is a lack of attention to the evidence offered by their proponents about the benefits smart cities offer to the many sectors and the stakeholders. It is strikingly hard to find concrete accounts of the practical impacts of smart city initiatives. Exploring the relationship between the objectives and the impacts arising from the deployment of local smart projects is in its infancy. It has yet to be demonstrated whether, in practice, smart cities can speed up developing the best solutions to societal challenges or the sharing of public value, as many have claimed they do. Against this backdrop, the paper presentations on this panel session propose new methods and metrics for the Triple/Quadruple Helix as an innovative topic that advances knowledge on collaboration for economic progress, social development and sustainability, in smart cities as enabling spaces for effective and efficient collaboration between government, industry, researchers and the citizens. The discussion is inspired by experiences in two major European smart cities projects Triangulum and CityVerve.

Speakers:

James Evans (MUI), Maria Karaulova (MIOIR), John Rigby (MIOIR), Kelly Watson (SEED), University of Manchester
Youth Voices and Young Enterprise: Reflections, Case Examples and Calls to Action to the Quadruple Helix Actors

Sally Randles, Dane Anderton

Dept. of Strategy, Enterprise and Sustainability, Business School, Manchester Metropolitan University

Young people are our future. And yet, the Deloitte Millennial Survey (2017)\(^1\) shows millennials to be apprehensive: they are seeking stability and opportunities in an uncertain world. Only 48% of those replying to the survey from emerging economies expect the social/political situation in their countries to improve in the next 12 months. Shockingly this figure is halved, to only 25%, for those responding from mature markets. Recent events – conflict and displaced populations in the Middle East; security threats, Brexit and the US Presidential election, appear to be seeding this apprehensive uncertain outlook for young people. These results provide a wake-up call to the Triple Helix institutional leaders, especially in mature markets, including in Manchester where THC 2018 is taking place.

The results highlight the need for the TH Actors and beyond to involve young people – our future leaders of tomorrow – in inclusive conversations about what needs to done to improve this outlook and to build confidence by involving them in decisions today, which will affect their life-chances for tomorrow. Or, reap the consequences of an out-exodus of our talented and skilled youth, to countries where a better future is perceived.

Greater Manchester is known for its radical and progressive thinking. Our vibrant and energetic youth communities are no exception. This panel brings together Youth Voices and Young Entrepreneurs from Greater Manchester to explain in their own words the opportunities they have been given and the challenges they face, to succeed as young sustainability, responsibility and enterprise leaders of the present and future. They will outline their visions of the future and how they recommend the Quadruple Helix Actors work together and with the youth of today, to address the problems and issues which will enable us, together, to build the sustainable and responsible futures they would wish for themselves and their children.

Participants:
- Jamie Agombar, Head of Sustainability, UK National Union of Students (NUS)
- Kiran Arokiasamy, Manchester Entrepreneurs, Manchester Science Park, https://manchesterentrepreneurs.co.uk/ will be joined by successful young leaders and young entrepreneurs in an interactive discussion with the audience.

*Panel organised by the Sustainable and Ethical Enterprise Group (SEEG) Manchester Metropolitan University.*

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\(^1\). The Deloitte Millennial survey (2017) interviewed nearly 8,000 young people born after 1982 across 30 countries: 4,000 were interviewed in emerging markets and 3,900 were interviewed in mature markets. For more detail go to: https://www2.deloitte.com/global/en/pages/about-deloitte/articles/millennialsurvey.html
Creating Skills for Sustainable Futures: Mobilising the Triple Helix and beyond

Sally Randles
Manchester Metropolitan University, Business School

Transitioning towards sustainable futures requires a whole raft of agendas to be progressed simultaneously: building and renovating for low carbon buildings & infrastructure; collaborating to protect and increase urban green-space and biodiversity; benefiting from community energy; financing innovatively to allow green projects to flourish; achieving greater circularity from recycling, re-use , and product re-design towards new circular business models; addressing the plastics challenge; achieving water and flood resilience; and transforming energy, food and mobility systems.

Addressing these sustainability missions will require the development of a new and up-skilled workforce, crossing discipline boundaries and bringing together science, technology and engineering with management, arts and humanities. Competencies need to be built which combine discipline-specific knowledge, with practical inter-disciplinary problem solving skills. This workforce must be availed with life-long training opportunities from primary school to pensioner; at all levels from foundation skills to post-graduate; and be inclusive, providing access to communities and post-codes traditionally marginalised from such opportunities, so that all groups in society are enabled to fully participate in the workforce of Sustainable Futures.

The panel session will contribute to a conversation to identify the central skills and training elements needed to develop this workforce, and how we can put in place and scale-up a raft of end-to-end appropriate programmes. Similar conversations are occurring in cities around the world and the convenors of this panel welcome collaboration, partnership and co-learning on these topics through an interactive conversation with delegates at the Triple Helix conference.

Speakers:

- Alan Hendry, Global Head of Sustainability, Jacobs Engineering (Chair)
- Sally Randles, Manchester Metropolitan University, Business School
- Lewis Maani, Jacobs Engineering
- Phil Korbel, Cooler Projects

Panel organised by the Sustainable and Ethical Enterprise Group (SEEG), Manchester Metropolitan University.
4th Sector Knowledge Transfer Partnerships: Working examples of the Quadruple Helix in action.

James Selfe, Fiona Nightingale, David Wollard, Janice Murray, Anna Reeves, Hannah Smithson

1Prof., Manchester, United Kingdom, 2Innovate UK, Manchester, North Cheshire and Warrington, UK, 3The ACE Centre, Oldham, UK

The triple helix concept is the platform on which Knowledge Transfer Partnerships (KTPs) are based. KTPs were originally developed here in Greater Manchester over 40 years ago. The KTP programme is UK-wide helping businesses improve competitiveness and productivity through better use of knowledge, technology and skills. KTPs meet a core strategic need and identify innovative solutions to help businesses grow. They are a tried and tested vehicle for government funding to provide training and development to companies and for introducing academics to classic business principles in order to develop mutually beneficial research capacity. Manchester Metropolitan University is consistently in the top 5 in the UK for numbers of successful KTPs.

As Greater Manchester moves forwards with its innovative plans for health and social care devolution this panel session will discuss how devolution Manchester is being facilitated by the innovative use of KTPs which embed the quadruple helix. The quadruple helix is an extension of the original model and includes charities, social enterprises and community groups. Manchester Metropolitan University is one of the UKs leading universities for developing KTPs outside of the traditional manufacturing and industrial foci.

We will be illustrating our innovative approach to quadruple helix working by drawing on two recent case studies.

- The ACE Centre is a not for profit, registered charity and provider of Augmentative and Alternative Communication (AAC) and Assistive Technology (AT).
- Developing and embedding wide-ranging, effective practice within the Greater Manchester Youth Justice System: Linking theory to practice.

Key words: Knowledge Transfer Partnership (KTP), Quadruple Helix, Case studies
Partnerships towards Zero Plastics: What can be done?

Callum Thomas
Prof, Manchester Metropolitan University, Faculty of Science and Engineering

2018 seems to be the year the world woke up to plastic waste. In December 2017, China’s decision to ban imports of foreign waste, effectively cut off one quick-fix demand-side solution to what to do with excessive waste streams, other than land-fill it. Exporting it to China was no longer an option. The West responded with a raft of new waste pledges. Rallying calls came from all sides of the Triple Helix and beyond. In January 2018 the EU pledged that ‘every piece of packaging on the continent is reusable or recyclable by 2030’; and promised 350million Euros of research funds in support.

In the UK, the British Broadcasting Corporation (BBC) became a prime mover. The BBC were the proud producers of the ‘Blue Planet II’ series narrated by the iconic naturalist, Sir David Attenborough. The last programme in the series aired in the spring of 2018 achieved what the Triple Helix actors had so-far failed to do. Reaching into the homes and onto the TV screens of the general public, the sight of sea mammals wrapped and suffocating from plastic wrappings hit a nerve. The harm wreaked on marine (and land) natural ecosystems by plastic waste finally sparked the public conscience. The panel will discuss these issues from different perspectives and ask ‘What will it take to reach zero single-use plastics?’

Participants:

- Julian Kirby, Friends of the Earth, The Scale and Nature of the Plastics Problem
- Richard Smith, Head of Sustainability, The BBC.
- Stephen Jenkinson, Former CEO at Viridor Laing on Issues of operational & commercial feasibility and political viability of reaching zero single-use plastics
- Ed Randviir, Manchester Met Faculty of Science and Engineering. Technology, research and development: 3D printing from plastics waste

Panel organised by the Sustainable and Ethical Enterprise Group, Manchester Metropolitan University
Quadruple Helix Engagement and Intermediation for Responsible Research and Innovation

Emanuela Todeva Vice-President of the Triple Helix Association

Roundtable discussion by participants in the FIT4RRI project (fit4rri.eu)

Responsible Research and Innovation is at the heart of the current political drive for transforming the science base of the global society and economy. The key elements of this policy platform are: the call for public engagement of scientists; the transformation of science education towards a value based provision, ensuring gender equality, sound and transparent governance, open access to scientific and knowledge-based resources, and ethical conduct.

The project is focused on the six elements of Responsible Research and Innovation (RRI): Public and Societal Engagement, Open Access, Gender equality, Ethics, Science Education, Governance, Open Science

Responsible Research and Innovation (RRI) implies that societal actors (researchers, citizens, policy makers, business, third sector organisations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society.

The project is intended to help mainstream RRI & Open Science (OS) in research performing organisations (RFPOs) through quadruple helix mobilisation to transforming the principles into practice. The thrust of the project is to focus the efforts of key stakeholders in four distinct science fields (Energy efficiency, Photonics science/applications in healthcare Material science (i.e. 3D printing) and Text & data mining) to explore and adopt the principles of RRI.

This roundtable forum will discuss the framework for implementation of responsible research and Innovation (RRI) and open science (OS) and will offer a critical discussion of cases where the quadruple helices engage. Through the practical experience and academic institutions engaged in university-industry partnerships and pushing the boundaries of governance of innovation and the public/private interface, participants will address the challenges of responsible research and innovation in a quadruple helix model.

Among the questions discussed will be:

1. How can RRI and OS add value to research?
2. Which ones of the components of RRI are most prominent?
3. What are the challenges for a quadruple helix engagement in an innovation context?
4. What is the current stakeholder view on the quadruple-helix engagement?
5. Who are the relevant actors in a specific ecosystem environment?
Chair: Emanuela Todeva – Vice-President of the Triple Helix Association

Presentations:

- Exploring the ‘Living Labs’ Methodology for Citizen’s Engagement, Juan Bertolin (ESPIATEC, Universitat Jaume I and Triple Helix Association, Spain)
- FIT4RRI Methodology for Quadruple Helix Engagement, Adrian Solomon (South East European Research Centre, Greece)
- Performance Measurement of Turkish Techno-parks, Hülya Ünlü (Cankiri Karatekin University, Turkey)
- Exploring a Multistakeholder Engagement for RRI and OS at the Open University, Petr Knoth and Nancy Pontika (Open University, UK)
- Discussants: Abid Shirwani (South Asia Chapter of the Triple Helix Association); Panayiotis Ketikidis, Greece Chapter of the Triple Helix Association)
Triple Helix and local industrial strategies

Andrew Westwood¹, Kieron Flanagan¹, Francesca Froy², Katrina Hann³, Tom Forth⁴

¹University of Manchester (UK), ²University College, London, (UK), ³Katrina Hann (Greater Manchester Combined Authority, UK), ⁴Tom Forth (Open Data Institute, Leeds)

Industrial policy is making a come back of late at regional, national and international levels, driven by a perceived failure of traditional policy frameworks and models to drive growth and structural change and address societal challenges, such as poverty and climate change.

Modern industrial policy has been informed by a (sometimes confusing) mix of ideas and concepts, from smart specialisation, entrepreneurial ecosystems, related variety, etc.), leading to multiple interpretations and implementation approaches.

The UK Government published the ‘Industrial Strategy: building a Britain fit for the future’ White Paper on 27th November, setting out a long term aspiration to boost productivity and tackle challenges such as AI/digital, green growth, future of mobility, and healthy ageing. A central feature of the national industrial strategy is the importance of place and the need for local industrial strategies if the UK is to raise productivity and earnings locally and nationally. Greater Manchester is one of the selected ‘trailblazer’ areas – together with the Oxford-Milton Keynes-Cambridge corridor and the West Midlands – to work in partnership with the Government to develop one of the first local industrial strategies

Informed by the case of Greater Manchester, this panel aims to contribute to the on-going debate on the why and how (and for whom) of local industrial strategies and the role that the Triple Helix, and particularly universities, might play in the development and implementation of local industrial strategies.

Speakers:

- Andrew Westwood (University of Manchester) (chair)
- Kieron Flanagan (University of Manchester, UK)
- Francesca Froy (University College, London, UK)
- Katrina Hann (Greater Manchester Combined Authority, UK)
- Tom Forth (Open Data Institute, Leeds)
Paper abstracts
The primary focus of this study is to analyse motives for enterprises to pursue green, sustainable, and environmentally friendly innovations. The topic of green innovations has recently gained attraction among scholars and policymakers, but we have yet to see empirical studies that investigate what potentially motives enterprises to pursue product or process improvement or renewal in an environmentally friendly direction. Empirically, we analyse a large-scale dataset from Norway and find that enterprises with organisational slack, an analytical knowledge base, innovation collaboration with external actors, and international market orientation have the strongest motivation to pursue green innovations in terms of reducing material- and energy costs and other environmentally negative effects. Also, we find that location in economic regions with low population spanning a large geographical area further motivates enterprises to pursue green innovations. For comparative reasons, we analyse other motives for enterprises to innovate finding that product enhancement, replacement, improvement, and flexibility, increased production capacity, cost reductions, and improvement of employees’ health and security, largely, are a function of the same enterprise- and region-level characteristics as describe above. The two major contributions of this study are as follows: First, factors that motivate enterprises to pursue green innovations do not deviate substantially from other motivational factors that relate to economic performance. In other words, there is not necessarily a dichotomy between enterprises pursuing green innovations vs enterprises pursuing innovations that can increase economic performance. Second, enterprises located in sparsely populated regions spanning a large geographical area have the strongest motivations to pursue both green innovations as well as other innovations that can increase economic performance. The latter reported findings may be attributed to particularities of the national context in which the study has been carried out, and we call for future research to gain further insight into this issue.
The Brussels Technology Transfer Ecosystem: A Historical Perspective

Geoffrey Aerts¹, Thomas Crispeels¹
¹Vrije Universiteit Brussel, Brussels, Belgium

This paper provides a historical overview of the evolutions that have guided the formation of the Brussels technology transfer ecosystem. The research effort finds its relevance in the description of the evolution of the ecosystem and the socio-economic impact of the university spin-offs that were established within this geographically scoped technology transfer ecosystem. Furthermore, the paper offers an integrative research method that both qualitatively and quantitatively captures distinctive ecosystems. The research adds to the technology transfer knowledge base as it drives the case-based comparative analyses of technology transfer ecosystems further. The findings provide a clear overview of the technology transfer ecosystem within the broader Brussels region. These finding deepen the understanding of the socio-economic impact university spin-offs have within their ecosystem. The research finds that university spin-offs generate added value for a broad set of socio-economic actors. However, a spin-off’s impact on the regional economy can often be overstated as added value is not necessarily generated in, nor directly linked to the geographical region where the parent university is located.

This paper contributes to the study of tech transfer ecosystems as it offers an integrated approach towards the mapping the development of ecosystem descriptions. This method allows us to broaden the research field through comparative research methods. From a societal perspective, the research provides input to the discussion on the role of both national and regional industrial policy making, the use of subsidies in the promotion of application-oriented research, as well as on the role of policy-makers as stakeholders in the technology transfer ecosystem.

Keywords: (Technology transfer ecosystem, University-industry collaborations, Triple helix model)
On sustaining regional development: Do localised networks matter?

Rhoda Ahoba-Sam, Lincoln University

With the advent of globalization and the subsequent competitiveness of the world’s economic terrain, regional development through University-Industry collaborations (UICs) has been accorded much importance. Even though it can be expected that there are knowledge-based interactions at various levels of the regional spectrum, it is important to note that these interactions are actually between individuals in the given organisations. Specifically, given that University-Industry relationships are built around, and facilitated by the actions of certain ‘knowledgeable’ individuals, it is interesting to appreciate what specific practices the concerned individuals employ to ensure maximum and sustained contributions to regional development through their networks. Focusing on the networks of academics, the given study seeks to probe the question of, if localised relationships really matter for regional development, and what measures are needed to foster more localised networks? Empirical data is collected through in-depth interviews with academics from the University of Lincoln, UK and the University of Stavanger, Norway. Preliminary findings indicate that while localised networks are indeed very important for a given region, extra-regional networks also contribute significantly as a source of new knowledge. This therefore specifies a ‘double-edged’ role for both university and regional administrations to implement measures that would foster more localised networks but not to the detriment of extra-regional networks. And while the modes through which academic networks contribute to regional development are varied, a better alignment of the expectations and efforts of academics and their collaborators towards focusing primarily on the ‘job-at-hand’ would ultimately improve their contributions to regional development.

Keywords: University-industry collaboration; networks; individuals; geography of collaboration
Entrepreneurial University Indicators: the case of Brazilian Higher Education

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Abstract: The aim of this study is to propose a performance measurement system of indicators to evaluate entrepreneurial activities in Brazilian universities. The study has been developed through a research on the basis of literature background and a survey with 51 preliminary indicators covering commercial and social entrepreneurship dimensions. The survey was sent by e-mail to 119 universities TTO’s that had answered the annual report from the Ministry of Science, Technology and Innovation (2015). The sample is divided by region equivalent to regional proportion in the total to be representative of regional diversity. In the total 40 TTO’s took part in the survey. Due to the data collected showed low level of responses regarding quantitative data the chosen methodology was the Multiple Correspondence Analysis to explore the relationship between some variables in order to examine how the different categories of indicators can relate to one another. Twelve variables were used and the independent variable chosen was the Intellectual Property Policy Implementation Stage that is divided in three categories: emergent, intermediary and mature. As a result, it is possible to evaluate the entrepreneurial activities developed in Brazilian universities in the actual context considering that in 2004 the Innovation Law was approved which objective to stimulate innovation and entrepreneurship in the universities and innovation in the companies. So, the universities have been in a process to change the internal culture and procedures directed to this new mission. Based on that analysis, a multidimensional framework for measuring entrepreneurial university is proposed with a set of 17 key performance indicators to evaluate the entrepreneurial orientation and 12 qualitative questions to understand the local context related to insertion of entrepreneurial vision in university activities.

Keywords: indicators, entrepreneurial university, triple helix
Cultural and Creative Industries and Knowledge Transfer: A Quadruple Helix Approach in Selected Atlantic Regions

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The last decades witnessed the changing of university-industry-governance interactions. This process has led to successive waves of policy-making aiming at bridging the gaps between formal and informal knowledge and potential market opportunities, promoting innovation and regional development. There is a growing emphasis on knowledge transfer and valorisation as a crucial element to instigate innovation in a variety of sectors. The relevance of knowledge transfer initiatives and the success of academic spin-offs, among other mechanisms, are evidence of the paradigmatic change within the quadruple helix. One of the sectors where this process is less clear is the Cultural and Creative Industries (CCI) and some of its specific subsectors (e.g. performing and visual arts), where informal knowledge, situational ties and contextual scale are much more present, and where the role of the university as an enabler of knowledge transfer is less clearly defined. The project 4H-CREATE – Quadruple helix to stimulate innovation in the Atlantic Cultural & Creative SMEs has sought to target precisely the understanding of knowledge transfer mechanisms in CCI SMEs. For that the project will use a quadruple helix approach to identify innovation opportunities, key actors, challenges, and solutions in the CCIs sector. This communication provides a preliminary analysis to the sector in the Atlantic Area, attempting to clarify the relationship between university and industry, emphasising the roles of knowledge production and talent training. A dedicated CCI knowledge transfer and valorisation model is suggested based on the analysis of the Atlantic Area selected case studies.

Keywords: Quadruple helix; Cultural and creative industries; Innovation; Small and medium enterprises; Atlantic area
The role of universities in smart city projects

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There is an increasing interest to make the cities ‘smart’ by implementing innovative solutions in response to the socio-economic, environmental and governance challenges threatening the overall well-being of citizens and their quality of life in urban settings. In addition, the lack of a common understanding on various aspects, such as definition, content, scope, and measurement, of the ‘smart city’ concept makes it attractive for academia as well. Despite the fragmented nature of approaches to the concept, several smart city initiatives have been put into force and being implemented especially with the push by international organizations like European Union. By bringing together various stakeholders from academic, business and governmental domains around the common theme of ‘smart city’, these smart city initiatives and projects represent a perfect illustration of triple helix concept. Rather than treating the institutional spheres of universities, industry and governments, which are deemed conducive for innovation and economic development, separately, the triple helix model focuses on the interactions among them. In the model, the role of universities is emphasized as being the critical actor responsible for the creation and dissemination of new knowledge and ideas as the bedrock of innovations. In the light of this theoretical background, the paper will discover the role of universities in smart city projects funded by European Union from the triple helix perspective. The initial findings show that universities’ full potential are not materialized. The universities taking part in project consortia are treated as knowledge providers as expected, but their capability in attracting smart people into their cities is neglected mainly due to the technological focus of project designs.

Keywords: Smart cities, universities, Triple Helix, Lighthouse projects, European Union.
Innovation and capabilities building in biopharmaceuticals in Brazil: a knowledge network analysis

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Innovation in biopharmaceuticals involves a complex and systemic network of agents and institutions, which includes a set of institutional arrangements between sectors and supply chains, large and small companies, public and private organizations, STI agencies, health regulation bodies, industrial and S,T&I policies, health policy and the regulation of intellectual property, among many others elements.

This paper aims at providing an initial assessment of the biopharmaceutical innovation system in Brazil by mapping the main groups of actors that integrate such system and by analyzing the importance and nature of the university-industry relationships in crucial areas to the biopharmaceutical research, development and innovation (RD&I) chain consolidation in the country. Overall, the analysis aims, firstly, to evaluate and quantify the value chain density in the main segments of the chemical and biotechnological base industry in Brazil by identifying its main links (actors) and interactions established between the CT&I infrastructure and the productive structure (biotech start-ups, private and public pharmaceutical laboratories, etc.). Secondly, in doing so the paper also intends to shed light in the main differences in interaction patterns between national and multinational companies, in view of their demand for R&D projects throughout the different stages of the biopharmaceutical R&D chain. Thirdly, the analysis also allows to highlight the importance of certain S&T organizations as the most relevant links of this chain in view of their centrality in the formation of knowledge networks. The proposed analysis is based upon data obtained from the Brazilian National Council for Scientific and Technological Development (CNPq) concerning the relationship between research groups and the industrial sector in the 2014-2016 period. The database provides detailed information concerning both the research groups and their partners involved in university-industry relationships.

Keywords: Biopharmaceutical Industry, university-industry relationship; sectoral system of innovation.
This work presents a research effort to comprehend the success of the Research Triangle Region (RTR), an economic development area in the state of North Carolina, USA, which comprises several innovation environments (IE). The research question was "how is the development level of RTR initiatives," regarding university-industry-government-society-environment linkages maturity.

The research design was descriptive and exploratory. The case study method was method chosen, and two parks were selected: the Research Triangle Park and the Centennial Campus. The immersion was performed from 2016 to 2017 and involved a literature review, a collection of documents, and non-structured interviews. A survey was tried but the amount of data was not relevant. The A Model for Innovation Environment Management (AMIEM) was applied to assess the RTR parks. AMIEM is an assessment and management tool based on a quantitative-qualitative approach. Composed by eleven factors to measure the maturity level of the Quintuple Helix linkages from academia (knowledge producers), the productive sector of goods and services (knowledge producers and users), government (social and economic regulator), media and civil society organizations, and environment.

Regarding the findings, both parks reached a high-level of maturity on the 5H linkages. It does not mean they are perfect. Some possible enhancements were identified and suggested. Regarding the limitations of this study, the results can be upgraded with more interviews and actors. The amount of secondary data was substantial, and analysis of other actors and initiatives can improve the comprehension of the RTR. AMIEM's application is complicated due to the number of actors and initiatives at RTR. The model can also be enhanced. However, as a practical implication of the study, AMIEM is a management tool that recommends actions to improve the effectiveness of environments like RTR, what has value due to the lack of discussion about management/assessment of these spaces.

Keywords: innovation environment; AMIEM; RTP; Centennial Campus
How entrepreneurial university impacts on economic growth in an emerging economy

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The entrepreneurial university is becoming a dominant format for a modern university. It influences the local economy by producing strong research, technology transfer and entrepreneurship activities. In this new context, regional development is integrated into the traditional roles of the university. Due to the difficulty in measuring entrepreneurial activity inside universities, most academic studies have tended to focus on case studies. However, in 2016 Brazil changed this with the launch of an Entrepreneurial University Index (EUI) lead by five student organizations. This project is in its second edition, and aims to capture the entrepreneurial activity inside Brazilian universities in six dimensions: Entrepreneurial Culture, Extension, Innovation, Infrastructure, Internationalization and Financial Capital. Based on this data, this essay aims to answer the following question: what is the relationship between the entrepreneurial capability of brazilian universities and regional economic performance? The research empirically investigates the effect of an entrepreneurial university, measured by EUI variables, on regional economic growth measured by GDP per capita. This relationship was analyzed by multiple regression and correlation. The sample was composed of 21 states. The results reveal an association between variables of entrepreneurial university and the local economic growth, especially with three of the six dimensions - Entrepreneurial Culture, Innovation, Internationalization. However, the influence of some variables is negative: the higher the entrepreneurial activity inside the university, the lower the GDP per capita or vice-versa. The findings support the thesis that the influence of entrepreneurial activity depends on the level of economic development measured as GDP per capita. This also leads to the discussion of whether local environment are able to benefit from entrepreneurial programs inside university, and the adequacy of variables for the measurement of university performance. Finally, this is important to increase knowledge about how Triple Helix transition works in emerging economies.

Keywords: Entrepreneurial University, Economic growth, Regional development, Emerging economy and Entrepreneurship
Regional government from Andalucía (Spain) identified by the beginning of 2000’s the low investment in innovation from the private sector side and the lack of public-private cooperation in this field as big challenges to be overcome when targeting regional development. Thus, Technological Corporation of Andalusia (CTA), a regional public-private partnership, was created in 2005 to trigger Andalusian private sector innovation activities and to connect these activities with academia and society. Today, CTA is owned by ca. 160 companies from 6 sectors: ICT, Aerospace, Agrifood, Biotechnology, Construction, and Energy and Environment, being a multisectoral innovation cluster. CTA’s main activity has been advising, mentoring and funding (with own funds) innovation projects with clear and measurable market short-medium term application. More than 600 projects have been supported (total investment of ca. 160 mill. €, leveraging a private investment of ca. 450 mill. €). Furthermore, CTA develops a holistic approach to innovation by providing an integrated set of complementary services.

CTA becomes a successful example of a triple-helix driven initiative and cooperation approach, having private sector, academia and public bodies embedded in its governance structure. From public administration point of view, innovation in the region is boosted by CTA activities, supporting policies implementation (e.g. RIS3) and promoting Andalucía as a competitive region. From academia point of view, CTA is a link between them and companies (CTA only funds projects where part of the activities is subcontracted to Andalusian universities research groups). From the private side, CTA boosts knowledge transfer and supports capitalisation on R&D projects. This way, CTA has impacted regional growth as 1,46€ returned to the Andalusian economy and 0,23€ were reimbursed to the Andalusian Public Finance per € invested in promoted projects, 81% of total project budget is spent in Andalucía and ~22 jobs are created and maintained directly/indirectly per financed project.

Keywords: public-private partnership, innovation cluster
Technological capability and inter-organizational collaboration in an emerging economy.

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Technological capability of emerging economies firms is recognized as one of the most valuable resources that provide sustainable competitive advantages (Lall 1992, 1994, 2000; Bell & Pavitt 1993; Kim 1997, 2000). Technical advancement is a key driving force and an important source of economic and social development (Nelson 1987; Wignaraja 1998; Pietrobelli 1998). In addition, technology has become the centre of competition in the world market. The development of technological capability has been studied in a large body of literature (e.g. Lall 1992, 2000; Bell & Pavitt 1993, 1995; Kim 1997, 2000; Wong 1999), however, TC building still in emerging economies are not clearly understood (Katz 1984, Lall 1992; Wignaraja 1998), and more recently by Molina-Domene & Pietrobelli (2012), in particular how firm develop technological capability remain under explore area of research in emerging economies context. Only limited studies have explored the relationship between inter-organizational collaboration and technological capability. Therefore, the main aim of this study to investigate the influence of inter-organizational collaboration for innovation on technological capability building in emerging economies. Therefore, this study specifically focuses on seven IOC for innovation is: customers, suppliers, competitors, consultants, private R&D, universities, and government research institutions. This study will adopt a quantitative approach and use firm-level data from the 6th series of the Malaysian National Survey of Innovation, which provides information on innovation activities of firms over the period 2009-2011. Furthermore, semi-structured interviews will be conducted with a selection of firms as well as experts from the innovation field to have a deeper understanding of the above issues and further to interpret quantitative findings. This study enables mapping of important policy implications in Malaysia and also in other developing countries. From a practical perspective, it will provide new empirical evidence about the importance of innovative collaboration in aiding the development of technological capability through which firms can develop and gain sustainable competitive advantage for long-term survival.

Keywords: Technological capability, Inter-Organizational Collaboration, Emerging economies, Innovation survey.
Governing the ‘impact agenda’ in the UK: Implications for social sciences and humanities

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Description: As a sector, higher education is now a very diverse environment bringing together a whole range of actors – from academics and other university staff to governments, policy-makers, funding agencies, research councils, business and others. The boundaries between universities, government, industry and other stakeholders have become increasingly blurred, with non-academic actors getting more and more involved in setting priority research areas, determining research agendas and articulating societal ‘challenges’ to be addressed. In this context, universities are often framed as ‘problem-solving’ organisations, expected to provide quick answers to a variety of economic and societal issues. While there have always been expectations that universities give something back to their societies, there are now increasing pressures from various policy actors in the UK for research to have a more direct, measurable societal ‘impact’. This presentation provides a critical analysis of these developments, by reconsidering questions about the role of academic research in contemporary societies. Furthermore, it investigates the governance mechanisms behind the so-called ‘impact agenda’ in the UK and considers some of the implications of these developments for the social sciences and humanities. The approach used in the presentation is inspired by organisational theory, taking a dynamic view of social change as a multi-actor, agent-centred process. The data consists of interviews with three categories of respondents: academics, university leaders and stakeholders (such as research councils, funding agencies, government, business); in addition, it includes document analysis of key impact policies and examples of impact case studies. The analysis focuses on actors, relationships and tensions; it explores different conceptualisations and operationalisations of impact (and how they are reconciled), as well as tensions between universities and funders, but also tensions within universities – i.e. between academics and university leaders. Given its focus, the presentation fits the conference theme called ‘policy and governance of the triple helix’.

Keywords: governance, universities, societal impact, policy, actors
Understanding the Dynamics of Triple Helix Interactions. The Case of English Higher Education Institutions

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Whilst significant attention has been devoted in the literature to examining the institutional configurations, incentives, and the governance of triple helix university-industry-government interactions, less is known about the dynamic micro-foundations of these interactions. In order to address this gap, this paper examines how the third mission has been differently reconfigured and re-shaped over the years across universities in England. The paper articulates a micro-foundations model of the triple helix in terms of the combination and evolution of knowledge exchange activities, triple helix partners, and geography of interactions. Using data from the Higher Education Business Community Interaction Survey (HEBCI) for England between 2003/04 and 2011/12, our results demonstrate that each university has recognised their own entrepreneurial opportunities and heterogeneous set of activities, increasing differentiation and specialisation in patterns of triple helix interactions. Some universities, particularly ‘elite’ research intensive HEIs, have increased their involvement with larger firms, particularly in research oriented and ‘harder’ forms of engagement, while other HEIs, for instance so-called ‘plate glass universities’, overtime engage in a broad range of KE activities with low specialization, and a third group, particularly newer, less research intensive ones, increasingly rely on income from activities such as training and the use of facilities and equipment by firms. At the same time there is overtime a decreased engagement with SMEs and a lower share of knowledge exchange activities at the regional level.

Keywords: university; third mission; knowledge exchange; triple helix; micro-foundations
Trible Helix in Action: How Academia, Public and Privat Partners collaborate to Compete in Copenhagen

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Ørestad Innovation City Copenhagen (ØICC) is Denmark’s international innovation district. Close to the center, and close to the airport. This ideal location, combined with world-class infrastructure and a good mix of large businesses, startups, public institutions, and universities gives a vantage point for fueling cross-sector innovation, creating sustainable solutions and generating growth.

ØICC was founded in 2017 to unleash the area’s innovation potential. It is a neutral platform that facilitates knowledge sharing, creates professional networks, and supports member consortiums realize new projects and partnerships. ØICC always works in-between the local and global and helps strengthen the members’ international profile. It focuses on attracting talent and connecting it better to businesses early on.

Unleashing innovation is at the very core of ØICC’s many activities, and requires a well-functioning innovation ecosystem within the city. In this talk Carolina Benjaminsen, PhD, and CEO of ØICC, and Catharina Høgdal, Project Coordinator at ØICC will share how the Innovation Districts successfully can work with Sector Innovation. Benjaminsen will unfold how the mix of weak and strong ties between the district’s private companies, public institutions, universities and entrepreneurs are key to unleashing innovation between sectors. Benjaminsen will also share what barriers and thresholds we need to work with in order to create a strong Innovation Eco System. Høgdal will elaborate on some of the concrete results made with these models for Sector Innovation in Denmark’s International Innovation District.

Social Economy and Entrepreneurship as the new “battle-horse” in the evolution of Science and Technology Parks

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Social innovation, can achieve a significant role in solving social problems, challenge that would require the action of the so called quadruple helix: government, universities, private companies and society led by Science and Technology Parks as drivers of the Local Economy Development of a territory.

But, due to the fact that there are some differences between regular entrepreneurs and social ones: are actually the Science and Technology Parks able to provide the resources needed by latter? Science and Technology Parks have focused so far into fostering the creation of profit companies by entrepreneurs without paying attention to the society. Actually, the focus was “the client” and trying to find solutions for clients' problems (pains) but leaving aside if the impact could generate well-being in the environment.

Few Science and Technology Parks have focused their core business into Social Innovation. One example is Parque Científico de la Innovación Social (PCIS) from Colombia that recently has published a book “Innovación Social en Latinoamérica” that details how Social Innovation can be achieved in LATAM. Another example is espaitec, Science and Technology Park of Universitat Jaume I of Castellon that has launched a specific Itinerary for Social and Technology Entrepreneur focused into university community (students, alumni and researchers)

This new trend of supporting social entrepreneurs and their special nature leads to a discuss regarding a new approach in front of traditional science and technology parks. Moreover, and focusing into Social Innovation another questions are raised: Should STP responsible of inoculate social sensitivity and ethical approach to their entrepreneurs and companies? Should STP become a reference to the rest of the innovation ecosystem in terms of Social Economy, that is to say another way to produce, undertake, manage and consume in the society?

Keywords: social economy, social entrepreneur, innovation, knowledge economy
Innovation through biodiversity: the ecosystem challenge to foster

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The sustainable use of biodiversity is a major challenge for countries where biodiversity is a potential economic driver. Since the Convention on Biological Diversity (CBD) in 1992, access to genetic resources and benefit sharing (ABS) have been receiving attention from different stakeholders. There is a global movement to define guidelines that regulate ABS both at national and international levels. Brazil, recognized as a megadiversity country, established its first legal framework in 2001. Studies have shown that this framework was responsible for precluding investment in developing innovations based on biodiversity. A new and broader legislation was recently established in order to better regulate this new sector and remove barriers for investment. This work is based on the results of a study oriented: a) to understand how industry is investing in biodiversity-based innovations in Brazil; b) to identify the main obstacles associated with these investments; and c) to propose policies and strategies able to foster the creation of an ecosystem of innovation related to the sustainable use of biodiversity. In order to cope with these objectives, we carried out: literature review; analysis of secondary data related to industry investment in biodiversity; a survey applied to selected companies; and a panel with representatives of industry. The main findings pointed to persistent barriers related to three main factors: regulatory (i.e. jurisprudence, alignment of private and public stakeholders, training, operationalization of the new model); economic factors (i.e. tax incentives, appropriate funding schemes, creation and coordination of value chains, relative prices of biodiversity inputs compared to substitutes); and systemic factors (i.e. data base about genetic resources and traditional knowledge, scientific and technological capabilities, marketing, valuation models). To deal with these issues, different actors are now being mobilized in order to build up the structures of an ecosystem of innovation headed to the sustainable use of biodiversity.

Key-words: biodiversity; innovation; ecosystem; sustainability
Prospective evaluation of Policy Instruments: What prescriptions for tackling the problem of antimicrobial resistance?

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This paper explores a way of prospectively evaluating policy instruments for the development and use of diagnostics for the management of antimicrobial resistance (AMR) in European countries. The proposed evaluation seeks to reveal tensions between the ideal policy design identified through a review of the policy literature (e.g. official national and international reports on tackling AMR), and the view of the actors/stakeholders from across the innovation system who work in the context of these new policies or take part in their implementation.

The research relies on Multi-Criteria Mapping (MCM), a method which enables each participant to evaluate individual policies and express views on the conditions under which these policies may be deemed as more or less successful, while at the same time expressing views on limitations and potential challenges for implementation. The interviews draw on subjects from six European countries representing a range of contexts (by GDP and population and prevalence of AMR). The countries selected are: UK, Italy, the Netherlands, Germany, Greece and Spain. The stakeholder groups interviewed included firms developing diagnostics, primary care physicians, pharmacists, hospital physicians, microbiologists, healthcare payers, and policymakers.

The results compare and contrast the views of interviewees grouped by countries and stakeholder group, to explore policy preferences in different context and under different assumptions. The results show that preferences among countries follow a broadly similar pattern, with three policy options (make pathways, incentivise use and fund R&D) finding more support. The paper also discusses how these policies may be fruitfully used while also describing the reservations and uncertainties of stakeholders to these (and other) policy options.

Keywords: Policy-mix, Antimicrobial resistance, innovation system, multi-criteria mapping.
Are Engineering & Technology Graduates Ready for R&D Jobs? Industry-Academia Collaboration Strategies for Training

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While the emerging countries are regarded as an endless pool of STEM graduates; in reality, most of these graduates lack the necessary skills needed for R&D jobs. Corporations are, therefore, required to invest significantly in developing on-the-job training programs for the graduates post-recruitment. Interestingly, to reduce the on-the-job training costs, corporations in emerging countries have been found collaborating with universities in teaching/education so that the university-teaching is tailored to address the skills needed for R&D jobs and the corporations receive R&D-ready graduates at the end of university education.

However, so far, in most studies exploring dynamics of I-A collaborations, research-based and entrepreneurial-based alliances have been the focal topics of discussion, leaving I-A collaborations for teaching/education tailored to develop skills for R&D jobs largely underexplored. The aim of this paper is to fill this gap and develop a better understanding of how such I-A collaborations occur, identify drivers for universities and corporations to participate in such alliances, and systematize different modes of collaboration.

Based on case-studies conducted on eleven companies’ partnerships with universities in India, which also allow us to relate the paper to the conference theme “Triple Helix in transition and emerging economies”, for developing graduates with R&D skills, we identify three distinct modes of education-based I-A collaborations: companies offering training programs to students as a part of the university-curriculum; companies offering training programs to students outside the university-curriculum, and companies setting up laboratories at universities primarily for teaching purposes. To operationalize the alliance modes, we also find that companies have developed three alternative delivery mechanisms: involving companies’ own employees; trained faculty of the partner university, and trained third-party organizations.

This paper contributes to the triple helix literature by proposing a new research avenue on I-A collaboration in education/teaching and highlighting the role that government plays in facilitating such collaborations.

Keywords: Industry-academia collaboration, teaching, emerging countries, R&D, skills
One benefit of the Triple Helix is that it purports to decrease the costs associated with large scale R&D projects. Etzkowitz (2008) explains that third sectoral participants can mediate the relationship between the other two to affect these decreases. However, the third participant might also exacerbate costs. The focus of this paper is on costs associated with research administration, specifically government funded academic research, some of which also involve an industry or other university partner. Concerns about the rise in regulations to which US University researchers must comply suggests that the government-university leg of the Triple Helix already involves extensive burdens (National Science Board, 2014). The addition of the business leg of the Triple Helix might be expected to add more administrative burden by requiring additional paperwork such as nondisclosure agreements. On the other hand, government funded university-industry collaborations might not add noticeably to the research burden particularly compared to multi-university projects. Companies might have more streamlined processes for research administration, resulting in faster turnaround times and fewer requests for additional information. The point is that this burden and the factors behind it have not been much studied. This paper compares industry-university collaborations with multi-university collaborations and single investigator experiences using a dataset of 100 interviews with randomly selected investigators in the Southeastern US who have active US National Science Foundation (NSF) awards. The interviews were conducted from September 2017 to February 2018. The results indicate that collaborative research compared to single-investigator studies funded by NSF is not uncommon, and that while university-industry collaborations have considerable administrative burdens, multi-university collaborations, particularly those involving subcontracts, are associated with even more administrative burdens. The implication of this work is that the single investigator model of research administration burdened should be modified to account for the diversity of research collaborations.

Keywords: University Research Administration Burden

Fostering the Growth of Student Start-ups from University Accelerators: An Entrepreneurial Ecosystem Perspective

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Despite their significance, firms created by students have been the subject of little research. Adopting the entrepreneurial ecosystem framework, this paper examines the growth of student start-ups, especially those that participate in university accelerators. Focused on the University of Toronto, this paper contributes to an understanding of how university accelerators can better support the entrepreneurial efforts of students. In particular, it demonstrates that firms, which participate in accelerators with a screening process have a stronger performance in both employment and product growth. Moreover, a habitual entrepreneur director or a more intensive accelerator program is found to have more positive effects on product growth at firms than on employment growth.

Keywords: University, entrepreneurial ecosystems, accelerators, students,
What frameworks for analysing socially responsible innovation—Triple Helix or Quadruple Helix?

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This paper compares the Triple Helix model and Quadruple Helix model in terms of their usefulness in analysing socially responsible innovation. The concept of Triple Helix model was originally developed by Etzkowitz and Leydesdorff (1995) to explain the dynamic interactions between university, industry and government (in the form of “taking the role of the other”) for fostering entrepreneurship, innovation and economic growth in the knowledge-based society. The Quadruple Helix model, adding the public or civil society as the forth helix, was initiated by Carayannis and Campbell (2009) along with their elaboration of the concept of Mode 3 knowledge production.

There is a seemingly shared view about Quadruple Helix is more timely and suitable for analysing social responsible innovation, which has increasingly become the emphasis in both policy rhetoric and academic literature when portraying or discussing the future of innovation in our society. The literature respectively using the two concepts tends to be divided. Does the concept of Triple Helix fade off because of its ignorance of civil society? Is civil society really missing from the Triple Helix? Whether some synergy could be achieved by integrating the two concepts or theoretical advancement in understanding the nature of socially responsible innovation? The paper will specifically answer these questions based on careful reading and analysing the existing studies on Triple Helix, Quadruple Helix and Responsible Research and Innovation.

Keywords: Triple Helix, Quadruple Helix, Civil society, Responsible research and innovation

References


Network typologies in patenting activity of academics before and after IPR regulation changes in Italy

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During the 2000s, the growing role of universities in the competition over propriety rights of academic inventions in Europe and in Italy, has changed the ground over which the cooperation of activities of academics and firms takes place. Recently the research over the effects of such changes on patenting activity of European academics, has reached new interesting results (among others Della Malva et al. 2013; Czarnitzki et al., 2015; Ejermo, Toivanen, 2018)

In this paper we want to contribute to this stream of literature, considering if the network relationships of academic inventors have been influenced by the introduction of new regulations, focusing on the case of Italy and, more precisely, on the patenting activity of academic inventors in the chemical sector over the period 2000-2010

Data and methodology

Data on academic patents were retrieved from the APE-INV and data on academic inventors were collected through the Ministry of University and Scientific Research official database. Information on the attitude towards patenting of Italian Universities comes from Baldini et al. (2014)

Form a methodological point of view, we applied Social Network Analysis tools to explore the sub-network structures in owned and invented patents adopting a blockmodeling approach (Doreian et al., 2004) and following previous work in the field (Capellari, De Stefano 2014, 2016).

Results

Preliminary results confirm that three sub-network typology could be identified in particular regions of the overall network structures arising around each university. These structures seems to change accordingly to: a) the scientific subsectors of academic inventors; b) the changes in the National Law c) the university individual strategies.

We plan in the future to launch a survey on central actors and extend the analysis to different scientific sectors
Does government engagement with university and industry significantly vary between the US and EU?

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Collaboration between university and industry has increased of late. Oftentimes state actors become involved. When this happens a number of questions emerge: (i) does government involvement in a university-industry (UI) partnership add value above and beyond that which would have occurred had they not become involved? (ii) how is the value that the government introduces (to UI partnerships) influenced by the scale at which they engage? (iii) does the government engage at scales that optimize their value-added? This study considers the degree to which state actors add scientific value (measured in terms of citation impact) to UI partnerships and how this value is spatially mediated. Scales of engagement are measured in terms of how proximate government actors are to their UI collaborators. Assessing the value that state actors induce across the spectrum of UI partnerships is useful for identifying scales at which intervention by government organizations is more efficient and justified. The case study for this undertaking is nanotechnology, one of the most promising emerging technologies of the 21st century. This technology has attracted considerable attention from, and collaboration among, university, industry and government actors alike. The geographies studied in this analysis are the US and the EU. It’s interesting to compare (i) the frequency with which the government engages UI partnerships, (ii) the efficiency with which the government engages UI partnerships and (iii) the value the government adds to UI partnerships across these regions. Are effective scales of engagement the same for both regions? Results are expected to inform policy vis a vis how and when state actors optimally engage UI partnerships.

Keywords: proximity, spatial scientometrics, ideal engagement
Policy and governance challenges to universities IPR regulation: evidence from the Portugal and Brazil

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Recently, many universities have acted to develop a ‘third mission’ by fostering links with knowledge users and facilitating knowledge transfer to firms and industries. University-business collaboration (U-B) is important for solving fundamental research problems to turn patents into business opportunities.

The objective of this paper is to present changes in the regulation of industrial property management in the academic institutions of Brazil and Portugal, as well as the impact on university patents under the organizational aspect of Knowledge Transfer Offices (KTOs) as intermediary agents.

In both countries, innovation and Industrial Property laws have been passed in the last decade, assigning ownership of inventions to universities and establishing a royalty share with university inventors, while enhancing the institutionalization and strengthening of KTOs.

In Portugal and Brazil, the U-B gap has been widely brought to RTD policies fora to minimize the paradoxical differences between indicators of scientific, on one side, and technological production (patents) in economic activities, on the other side. In both countries, the number of scientific papers per inhabitant increased at an annual rate of 10% in the last decade, with Portugal being above the European per capita average (ahead of France, Germany and Spain) and Brazil being the 15th in world scientific production, while the number of patents in the USPTO remains very low. This scenario might suggest that both countries share a "European paradox", with clear difficulties in converting scientific knowledge into technical progress.

The paper will show that for Portugal it might be stated the existence of a European paradox, while for Brazil, any connotation of a possible "Brazilian paradox" like the European would be a hasty approach. However, for both countries there is still a long way to go for converging their KTOs and U-B collaboration to those of more advanced economies.

University–industry relationships, University patenting, Knowledge Transfer.
Endogenous technological competences and product diversification: A close relationship?

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Diversification is highly cited as a driver of economic growth. Either when referring to technologies or products, scholars have already demonstrated that increasing diversification have led countries to higher development. Lately, diversification studies have modeled economies based on a complex system approach that have allowed testing whether current countries’ portfolios determined the rise of new industries. Nevertheless, those studies have been constrained to explore the effect that either current countries’ technological competences or product portfolios may have on rising new technological competences or new industries, respectively. That is, studies following such approach have not analyzed the effect that endogenous technological capacity may have on rising new industries. We address such gap by modeling countries regarding their technological competences and products portfolios and by applying economic complexity methodological tools to test the effect that endogenous technological capacities may have on rising new industries. Our databases regard patenting –technological competences, 1,545,477 records, 655 patent classes- and exports –product portfolios, 988 types of products- data covering 195 countries during the 1988-2015 period. Our hypothesis is that for those countries whose technological portfolios are more closely related to new-to-the-country products the likelihood of product diversification is higher. In addition, the analysis explores the influence economic development may have on product diversification thereby testing the hypothesis that earlier stages of development are associated with higher likelihood of diversification regarding the effect of technological endogenous capacity. We expect to show that both hypotheses are true that is the close a new-to-the-country product is to the current country’s technological portfolio, the greater the likelihood of such country’s diversification, and that such effect is stronger in earlier phases of development.

Keywords: Diversification, Economic Complexity, Endogenous Technological Capacity
Growth and evolution of regional innovation system in Shenzhen: firm-level perspectives

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Keywords: entrepreneurs, open innovation, social capital, innovation system, Shenzhen

Existing studies on regional innovation system in Shenzhen have not sufficiently covered the broader, and diverse, scope of entrepreneurial communities in the city. Past studies have only paid attention to the existence of ‘Shanzhai’ entrepreneurs, who, until recently, had been commonly associated with the production of knock-off products. In this paper, I aim to construct a preliminary typology of entrepreneurial communities in Shenzhen into three distinct categories: 1) Shanzhai entrepreneurs, 2) hardware-based ‘maker’ entrepreneurs, and; 3) domestic, home-grown multinational corporations (i.e. BYD, Huawei, Tencent, and ZTE). The typology discussed here is based on two prerequisites: 1) the degree to which these businesses rely on open innovation (whether they primarily rely on internal or external sources for product and/or process innovation), and; 2) the type of social capital employed in relation to their open innovation framework. This study intends to provide a comprehensive picture about variation in the entrepreneurial activities through the framework of open innovation within an emerging regional innovation system (Shenzhen) in the context of a developing country (China).
Change and continuity: how universities underpin successive regional innovation strategies

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Whilst recent decades have seen a gradual increase in attention for regionally based strategies for innovation, there has also been considerable change in the nature of these strategies, both conceptually and practically. Conceptual models of regional innovation strategy have shifted from RIS, cluster and triple helix approaches to smart specialisation, in many regions associated with changes in the policy framework. Governments continuously change the strategy requirements on regions, in some cases, such as the UK, with changing geographies of regions as well as new institutional infrastructures as well as new formats for strategies. However, universities and firms tend to work to different timescales and look to invest in the longer term. So how do universities seek to influence the implementation of policy to ensure continuity in their relationships with business?

The paper uses the case of North East England to explore the evolution of regional innovation strategies over a twenty year period, mapping out university involvement in the strategy process, and identifying points of continuity across strategies. Over this period the region has seen the formation and then abolition of a regional development agency, the replacement by new local enterprise partnerships at a different geographical scale, and numerous innovation strategies including new science and innovation audits on a cross-regional basis. Throughout the universities have been able to maintain a core set of innovation priorities and industrial partnerships. A key question is whether this is a form of producer capture in which universities manage to obtain continuing funding for their own long term aims, or whether universities offer an institutional memory which enables continuity of regional needs across different strategy processes. Case studies are presented from the energy/subsea, digital technology and the automotive sectors involving several universities in North East England and associated business partners.

Keywords: policy-making, regional innovation strategies, university involvement, industrial partnerships
How university-centric innovative linkages influence national innovation performance: the co-patent perspective

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Abstract: This paper examines how university-centric innovative linkages influence national innovation performance from co-patent perspective. Especially, we focus on the co-evolution between university-centric interactions and performances. Through investigating the interactions of the university who collaborates with firms, research institutes, and other universities, we are able to identify that whether the university-centric interactions conduce to the development of national R&D activities and the increase of universities’ external R&D funding (such as the R&D funding of university-industry and university-research institute collaborations increase in various fields). We collect the secondary data from Ministry of Science and Technology and related ministries that help us to display Taiwan’s National Innovation System and related national R&D activities and funding. Furthermore, we collect patents data of total 156 universities in Taiwan who apply patents as assignees in USPTO (United States Patent and Trademark Office) from 1986 to 2015. Based on the patents and co-patents data, we are able to discover the evolutions of university-centric interactions during past three decades. Moreover, we use the network analysis to investigate IPCs (International Patent Classification) in order to explore the development of technological performance of Taiwan’s National Innovation System. The results not only show the coevolution between university-centric interactions and the performances of interactions, but also demonstrate that the development of university-centric interactions aligns with the evolution of Taiwan’s National Innovation System. The paper concludes that the universities in Taiwan have gradually transformed from the loose-coupled, interactive to dense network-typed systemic interactions during the past three decades, and the university-centric interactions co-evolve with industrial transformation in Taiwan’s National Innovation System. Some managerial and policy implications are provided.

Keywords: national innovation system, triple-helix interactions, co-patents, Taiwan
An Exploration of Triple Helix for Living Labs: Paradigm Shift of User Innovation

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The study intends to investigate a comprehensive model of Triple Helix for living labs, integrating the user innovation theory with the perspectives from producer innovation to free innovation. In consideration of current researchers cannot fill the research gaps up for development from empirical practice and theoretical framework in process, method and performance evaluation of living labs. The study proposes that free innovation from Von Hippel (2017) can be considered a framework shifted by motivationally focused collaborative participation that represent open user involvement. The roles of user in living labs include from government-sponsored institutes, academia, and also from enterprises. Specifically, the study evaluates two distinct innovation paradigm perspectives as comprehensive model- producer innovation, and free innovation- that can facilitate perceptions that exploration of paradigm shifts as a processes for new services and products in living lab.

The study examines the relationships of hybrid model and performance of living labs. The theory is grounded in the notion that, when used different mechanisms, these two different innovation paradigms maximize each of the design of comprehensive mechanisms engaging with users to occur in living labs. The study was designed involving qualitative methods by reports and semi-structured interviews from Taiwan. The results showed that some attributes of integration of innovation paradigms are acknowledged while conventional producer innovation perspective may not have sufficient explanation toward the development of living labs. Furthermore, the study distinguishes two integrations factors- innovation support, and innovation designs- that implementing and monitoring progress on the living labs as a means to enhance the effects of user innovation. The transitions and multi-functions of user ‘roles are also discovered and address in the research. Implications for theory, research, and practice are discussed.

Keywords: Living Lab, Open Innovation, User Innovation, Free Innovation
The Triple Helix for Work-based Learning

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Work-based learning (WBL) is an approach aiming to close the gap between employers and potential employees providing the latter with real life work experiences where they can apply the learning acquired through secondary, tertiary and vocational education. One of the main forms of WBL is apprenticeship, a form of contract that has existed for centuries but that until recently was relegated to blue-collar jobs. Apprenticeship is seen by governments as an instrument to reduce youth unemployment.

This paper is based on the work carried out for a EU-funded project on apprenticeship policies and describes how national, regional and local government helped the collaboration between educators and firms to define training programmes better suited to business needs. This work has also been useful to improve the implementation of public policies thanks to the direct engagement of the policy makers.

It's a case study and focuses on Lombardy, a Region in Northern Italy whose capital is Milan. It shows how government can have a role of mediator and facilitator and be perceived as a neutral broker rather than a hierarchical regulator. The paper shows that the triple helix approach is effective especially when there is reciprocal trust and commitment between the three components. Focus groups, official and project statistics and interviews have been used.

Keywords: work-based learning, apprenticeship, labour market policies, triple helix collaborative governance,
The Triple Helix in the EU narrative for Research, Innovation and Regional Development: an appraisal

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Keywords: (EU, Research and Innovation, Regional development, public-private partnerships)

Abstract:
The concept of the Triple Helix has been remarkably integrated in the narrative of the European Union, long before being identified as such by the academics that coined the term. The centrepiece of this movement has always been the Commission of the European Communities (now the European Commission) that historically assumed the role of the Government in the Helix. Universities and Businesses have been repeatedly called to action, mostly in partnerships, in the economically and socially significant fields of Research, Innovation and Regional development. From the European Steel and Coal Community to the full development of the Treaties and the modern European Institutions, partnerships between universities and businesses (often in many multiple configurations) have pushed forward the agenda of social and technological change. Interestingly enough, the movement has not been that forceful in the context of Regional Development with a few exceptions. This trend however has been reversed during the last fifteen (15) years when more emphasis was given to the role of universities and clusters driving innovation and regional growth, with a clear culmination marking the arrival of Research and Innovation policies for Smart Specialisation (RIS3).

The presentation will tackle the determinants of the Helix as identified in the successive configurations of the EU Treaties, focusing on the mostly significant areas of Research and Innovation and Regional and Urban policies. It will portray and analyse the various schemes introduced in the EU Framework Programmes as well as in Regional and Urban Policy with a strong TH flavour and attempt a taxonomy and an evaluation of their effectiveness.
Knowledge Entrepreneurship and the Role of University Research Centers and Public Policy.

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Aims and relevance
The objective is to analyze the creation and survival possibilities of the knowledge entrepreneurship (KE) grounded on: 1) the role of the Research Centers, RC, in technology transfer and incubation, 2) The public policy support.

Methods.
Based on a Questionnaire 80 entrepreneurship has been interview to grasp their innovations as well as the relations with universities and public support. An innovation index is constructed and applied to an econometric analysis to consider the importance of outside knowledge relations and the role of public incentives with the firm’s innovativeness.

The RCs are characterized in relation with its function to sponsor the Technology Transfer and entrepreneurship. The Public Policies are consider in the enhancement of 1) University and research centers Linkages, 2) Patents and Technology transfer, 3) Research networks and firm partnership 4) Joint ventures with industry.

Hypothesis
The KE survival and growth depends on 1) the industry accordingly to the kind of production and products knowledge 2) the institutional support, mainly on the knowledge provided by the research centers and public policies. 3) The kind of market in which the product and service management mix is an important strength for marketing sustainability. 4) The strategy based on networking and open-innovation produced new capabilities and flexibility to increase knowledge information, marketing and innovations management.

Findings and implications.
The lack of policies towards an entrepreneurial university and a passive attitude towards external links is an important factor for the KE’s low creation and support. The more active RCs are oriented to the commercialization of technologies, which is associated to the origin and trajectory of the RC.

Based on econometric analyzes the KE’s Innovation Index increases with openness (customers and suppliers) and the type of knowledge relationships with RCs, the kind of innovation Management.
Exploring the International Dimension of University-Industry Collaboration: the Case of a UK-China Innovation Programme

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Studies investigating university-industry collaboration and the role of universities in fostering economic development have mainly adopted a local approach, looking at how these interactions bring benefits at the regional or national level (Ankrah & Tabbaa, 2015; Youtie and Shapira, 2008). We argue that, given the fairly recent globalization of the higher education system, the role of universities as promoters of innovation and economic development should be revisited by incorporating an international dimension.

In order to do so, we consider the case of a UK-China Innovation Programme, ideated and developed by a UK University with the aim of supporting the creation and development of collaborative innovation between UK SMEs and Chinese organisations. Funded by UK national and regional government, as well as Chinese regional government, the programme supported a total of 66 UK SMEs in their collaborative R&D approach to the Chinese market. We carried out a longitudinal case study of the programme (2014-2018) through interviews to key people involved in the programme at the university, UK SMEs’ representatives, collection of primary data on the interaction between firms and the university by direct observation as well as primary data on the results of the programme. In light of the data analysis, we argue the need for a revisitation of the third mission of universities. Extending on the concept of universities as “knowledge hubs” (Youtie & Shapira; 2008), we explore the role of universities as actors that promote innovation and economic development by acting as intermediaries in the internationalisation process of firms through collaborative innovation. Additionally, analysing the type of knowledge exchange between university and industry occurring during the process, we suggest a possible reversal in the respective contributions brought into the collaboration: knowledge and technology by firms and access to market by the university.

Keywords: university-industry, internationalization, collaborative innovation, China, SMEs
What makes the helix turn? Designing collaboration between self-interested partners

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The image of the triple helix with three forces spiralling around each other has proven to be a powerful and inspiring image of the collaboration between government, business and academia. In the literature it is often assumed that the three parties will act in accordance with the common purpose that defines the helix in question. However, in reality there is not just the common purpose that brought them together, but there are also the separate interests of the three individual parties. All parties will say that they will contribute to the common purpose, but in reality they will only do so, if this also serves their own particular interests. Too many triple helix constructions fail, because they have not considered this basic fact. If there is no time limit set to the collaborative arrangements, this problem becomes less severe, but only if unwanted behaviour is punished by the other actors.

In this paper we use some notions from game theory and from organizational design to develop basic rules for the design of triple helix collaborative arrangements. Basically, these rules and arrangements need to ensure that self-interest and common purpose will concur. Transparency and awareness of potential punishment are important principles underlying the design of successful triple helix arrangements.

We will first discuss the nature of collaboration between self-interested parties and will illustrate this with several examples of triple helix situations in which the common purpose is not served in spite of public announcements by all parties that they will do so and where no-one is willing and able to change the situation. We will then discuss how a system of rewards and punishments can be used to ensure that all actors will act on behalf of the common purpose. This is simply a system of rules that influences the behaviour of all participating parties in such a way that they see it as their best interest to act in the way they had promised in the first place, i.e. to serve the common purpose. On the basis of that discussion, we will propose rules for the design of triple helix collaborative arrangements. These rules will include the following:

1. It should be expressed clearly to all participants, what each party is expecting to get;
2. It should also be clearly established, what each party is expected to contribute.
3. Both the common purpose, the individual interests and the contributions of each party should be defined in such a way that they are measurable, preferably quantifiable, so that progress can be measured also over time.
4. A preferably independent system of measuring progress with regard to both targets and contributions should be installed (i.e. there should no self reporting)
5. A preferably independent authority should be appointed that can evaluate progress and contributions with the power to withhold rewards or in other ways punish partners who do not fulfil their obligations.

Keywords: collaboration, design rules, self-interest
In 2006, the government of Quebec (Canada) launched a program called Sectoral Industrial Research Cluster. Through this program, Quebec’s government would support collaborative research projects between industry and academia in different sectors by funding research consortia. Those consortia would provide financing to research partnerships but they would all have to be constituted of at least two academic institutions and one industrial institution.

Although the consortia have been operating for over a decade, few studies have analyzed their model and their impact on the regional and national ecosystems. We performed an exploratory research to better understand these research consortia and their impact. We collected data through nine semi-structured interviews with government executives and representatives of those consortia and data from the Web and official publications. We focused our attention on six themes: history, modes of operation, relations with the government, role on the innovation ecosystem, intellectual property and relations with partners. We have built four cases.

Our results show that this initiative had several impacts on Quebec’s innovation ecosystem and on some of their specific actors. The initiative helped nurture innovation in the regions of Quebec. Over the years, an increased confidence between the actors of innovation has been seen and a culture of collaboration between academic researchers and industrial has risen. This measure also provided a unique place for actors in the research field to meet and exchange on their issues. Finally, it gave the government, industrials and universities a way to leverage on each other’s resources.

Our findings provide a good example of an innovation policy that is capable of structuring the ecosystem toward more collaboration. In addition, our research helps understand why the rest of Canada has been inspired by this program.

Keywords: innovations intermediaries, innovation ecosystem, collaboration
Reconciling scientific impact and societal relevance: the role of pro-social motivation and productive interactions

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Abstract
Scientific findings from publicly-funded research are increasingly expected to demonstrate both scientific impact and societal relevance. Scientific impact is associated with achieving recognition within the community of scientists; while societal relevance is related to the capacity to respond to the needs of non-academic audiences. Despite the advocacy of policy discourses, the pursuit and achievement of this dual mission face important challenges. The logics governing the production of research findings with scientific impact may substantially differ from (and often conflict with) the mechanisms underlying the generation of findings that achieve societal relevance.

This paper investigates individual and process-context factors that contribute to reconcile these two missions. First, we investigate whether scientists who exhibit a pro-social motivation for conducting research - i.e., promoting the interest of the community and the desire to benefit other people - are particularly capable to achieve greater performance in both scientific impact and societal relevance. Second, we examine whether engagement in “productive interactions” with non-academic actors contribute to attenuate the potential tensions between scientific and societal goals, by shaping scientists’ cognition, skills and attitudes.

The data used in this paper is based on: (i) primary data from a large-scale survey of Spanish scientists and (ii) secondary data from scientometric and news media sources. The selection of researchers to be surveyed is based on the records of authors who published an article indexed in Web of Science (WoS) within the period 2012-2014, and were affiliated to Spanish public research organisations (universities, PROs, hospitals). This sampling strategy resulted in a frame list of 57,406 scientists, and a total of 11,992 valid questionnaires. Secondary data provides information on citations to publications (WoS) to capture scientific impact, and on publication mentions in news media sources (blogs, policy briefs and news) as a proxy to capture societal relevance.

Keywords: scientific impact; societal relevance; prosocial motivation; productive interactions
Heterogeneity and homophily in actors’ engage in medical innovation: gender implications

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Drawing on gender biases and differences observed in academic paths, this paper aims to disentangle the gender dimension in biomedical research collaboration networks. We adopt a network approach based on the institutional diversity of nodes and the configuration of triads (coordinator, gatekeeper, consultant and liaison) as a source of diverse and non-redundant knowledge. Using data from 1,110 usable responses from a questionnaire administered in 2013 to biomedical scientists and technicians in the nine Spanish Biomedical Research Networking Centres (CIBERs), comprising research areas such as bioengineering and nanomedicine, epidemiology, or mental health. The questionnaire collected information about involvement in a range of medical innovation activities and included attitudinal and motivational questions such as prosocial behaviour, personality traits or tertius iungens orientation. These features are explored by gender and connected with biomedical scientist’s propensity to engage with alters from different institutional settings. Our early findings show that women tend to form more diverse networks triads that men, especially when they are embedded in homophily settings. Gender studies literature on innovation will be introduced in the analysis to conclude with possible policy implications.

Keywords: networks, innovation, brokerage triads, homophily, gender
As a diachronic model, the triple helix development model emphasizes the rise of an entrepreneurial university that incorporates classic ivory tower with a culture of innovation, knowledge exchange and capitalization. In this transition, higher education and research institutions integrate various elements from other actors through institutional role taking in variety of ways. This growing focus on competence building requires extensive resources to support socio-economic and human capital development activities and autonomy in the area of governance and integrated development. Based on an interview and desk research data, this paper argues that African universities need to re-organize and incorporate explicit economic socio-economic development mission into their activities. The starting point for this renewal is the delineation of universities development mandate beyond parochial political expediencies. This integrated triple helix development, it is argued, will enhance governance practices and anchor universities as critical developmental actors. Since the triple helix is based on the premise that the university plays an enhanced role in development in concert with government and industry, the two traditional leading institutional spheres, the model offers the potential for rapid integration and participation in the global knowledge-based economy making it possible for the acceleration of development that focuses on the academic sphere’s human and social capital creation abilities that may be utilized in the long run to potentially help create an industrial compass. It is in this regard that we focus on how African universities can be reorganized and transformed into the heart of development efforts without becoming a tool for the usual politics of convenience. This paper is relevance to the conference because it adds to existing literature on the growing importance of knowledge-based development and enhances our understanding of the African universities beyond the usual suspects.

Keywords: African universities, socio-economic development, governance, political economy, triple helix development
The objective of this paper is to establish the current status and development gaps of two identified traditional industrial clusters in the Iranian city of Mashhad; furniture and saffron. Using an analytical framework based on a culturally enhanced adaptation of Porter’s Diamond Model, a mixed method was adopted using a survey of mostly SME firms to gauge performance against cluster determinants, and a stakeholder interview phase to triangulate the survey findings and establish capabilities gaps and potential innovation routes for each industry and the region. The survey is based on a pool of 110 responding firms distributed across both clusters and analyzed using the Mann Whitney U Test. The 11 semi-structured interviews were conducted with expert stakeholders selected with a snowball sampling technique and analyzed based on thematic categories. Results indicate both clusters are in a relatively weak state regarding most of the framework determinants; except that for demand conditions. The saffron industrial cluster indicators were discovered to be in a marginally better state than the furniture cluster. As might be expected, the qualitative analysis of cultural determinants highlighted the clusters are equally impacted - being weak in both cases. A significant outcome linked a cultural lack of trust to the weak state of networking building capabilities and entrepreneurial activity. Key indicators of gaps in the regional cluster profile proffered structural developments required for both cluster groups - including establishing new networking infrastructure, incentivizing collaborations and stabilizing planning regulations.

Keywords: Cluster Development, Saffron, Furniture, Mashhad, Iran
Higher Education Institutions and Smart Specialisation: Embedding the triple helix in regional innovation strategies

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This paper presents insights from action research with regional authorities and Higher Education Institutions (HEIs) on the development of partnerships to implement Smart Specialisation Strategies (S3). Conceptually it is based on the 'Civic University' (Goddard) which like smart specialisation includes two elements that have been absent in the triple helix literature: namely, a demand led and strategic coordination of interactions where innovative collaboration is sought to address economic and social challenges emerging from a bottom up discovery process; and second, a place based approach where innovation is rooted in strong regional governance structures that bring together local innovation actors to address local demands while linking with others outside the region in multi-level global settings. Empirically it draws from case studies in five EU regions whose innovation systems and institutions are at very different levels of development. The case studies are part of a project on Higher Education for Smart Specialisation managed by the European Commission's Joint Research Centre, and the paper also makes policy recommendations on how to more closely involve HEIs in the design and implementation of S3.

Keywords:

Smart Specialisation, EU Regional Policy, Higher Education Institutions, Civic University
Envisioning the Entrepreneurial University: the Challenge of Stanford’s Venture

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Entrepreneurship has never been a branding effort at Stanford but rather the accretion of a series of organizational inventions that often became role models for its peers. Modulating aspiration and means, like a tuning fork seeking optimum pitch, the entrepreneurial university is in a state of perpetual tension. Should innovation and entrepreneurship be encapsulated in a specific administrative unit, a Technology Transfer Office (TTO), Incubator or Science Park, or should it be integrated into research and teaching activities, as well? Beyond the issue of separation versus integration, how should the university take into account the circumstances of its surrounding region in defining an entrepreneurial mission? Stanford’s 125 year experience as an entrepreneurial university is probed for replicable principles and practices.
Working Futures for Future Cities: for sustainable and inclusive smart cities

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Manchester was a founder member of the European Network of Living Labs (ENoLL) in 2006, building upon a series of European wide initiatives in which the city and its partners participated, including as founders of the Telecities network in 1993 and the Inter Regional Information Society Initiative (IRISI) in 1994. A common theme in all of these activities was that research and innovation should be more open and user driven and that there was, at least, a tripartite approach to achieving this through new forms of collaboration between the public sector, business and research. This laid the foundations for the embryonic network of Living Labs, established by the City of Helsinki in 2002, which became one of the practical expressions of what today is seen as the triple, or quadruple, helix approach to engaging with user driven open innovation and with civil society. Concepts of ‘smart cities’ and ‘future cities’ are merging and more human-centric objectives are being proposed, with ideas such as ‘liveable cities’. In particular the future of work and skills needs to be explored in this context particularly in relation to concerns that consequent job losses will occur at a faster rate than new technology related jobs will be created.

This paper will explore how the dominance of ‘tech push’ solutions, referred to as ‘smart-cities-in-a-box’, are being subjected to further scrutiny and critique, and how the availability and accessibility of digital production, including 3D printing, self-build electronics and rapid prototyping, offers new opportunities to re-localise production and create new opportunities for developing globally relevant employment and skills opportunities at a local level in the context of the circular economy. This includes new grass roots development through social enterprises, such as Living Labs, “hackspaces”, makerspaces and start-up accelerators, which focus on making production more open and accessible.

Keywords: future cities, sustainable and inclusive smart city
Territorial emergence of FDI: opening the black box of the “triple helix as practice”

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This research aims to understand the territorial management process behind the implementation and anchoring of a foreign direct investment (FDI) project in a country during its project life cycle. The objective is to provide insight into the strategic role played by stakeholders when implementing a FDI project in a territory. Who does what and how in the management of an FDI project is the central question in the strategizing process. By mobilizing the Actor Network Theory in a Strategy as Practice framework, we show in two cases of FDI projects how public management will produce an impression of failure in France and, at the opposite, demonstrate strategic agility in Brazil. Finally, we note that the actors’ power games will lead to the deconstruction of a "territorial triple helix" in France, while on the contrary they will promote its strategic emergence in Brazil.

This research challenges the classical linear views of project life and displays projects that follow a quite different path: when we think about or consult the literature on attracting and anchoring FDI projects, it seems that countries are concerned about market size, trade openness or interest rate data. However, in some case, it is possible to add an unknown or untouched criterion: the collaboration between agents of society that correspond to a “triple helix”. We emphasize the mechanisms, agreements and difficulties experienced by the government and the local community involved in the management process for the implementation and anchoring of an FDI project.

Viewing the attraction of FDI in collaborative terms provides new empirical evidence and explanations of the phenomenon. From this research, we can offer the following research propositions, which can be further developed and tested: 1. The use of a triple helix strategy is an attractive factor when applying an exogenous investment. 2. The entrepreneurial university is an attractive factor when applying an exogenous investment. 3. Contemporary public policies must be involved in complex networks with the community to achieve success when locating and anchoring an exogenous investment.

Keywords: Foreign direct investment (FDI), strategy as practice, territory management, triple helix, Actor Network Theory
The role of triple helix intermediate organization: Centennial Campus’ Springboard Innovation Hub case study

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The Triple Helix postulates that the interaction in university-industry-government is the key to improving the conditions for innovation in a knowledge-based society. In this model, the university is emerging as an influential actor, and the entrepreneurial university encompasses and extends the research university. Utilizing a case study, this paper contributes to the literature via exploring the roles that intermediate organizations can use to facilitate the triple helix relationship. Many different types of organizations have developed to support the triple helix arrangement, as the technology, science or university research parks. A university research park is a cluster of technology-based organizations that locate on or near a university campus to benefit from the university’s knowledge base and ongoing research. Considerable resources, throughout the world, are being devoted to parks as policy instruments for promoting research-based industrial, innovative activity, entrepreneurial culture and sustainable development. Drawing on empirical research from Centennial Campus (North Caroline State University), this case study shows the potential of a research campus park to be an engine for the Triple Helix. The Centennial Campus has a long history of supporting industry, government agencies and non-profits at its award-winning research-campus park. In the 2012, it devised a new model for engaging industry and government needs, aligned research and innovation through its Springboard Innovation Hub, that is a space and a concept where, “under the same roof”, people and organizations with an interest in innovation can discover ways to engage, collaborate and partner with NC State. Regarding the findings, the research designed shows that Centennial Campus, as intermediate organizations, has three differentials: the governance; the Springboard Innovation Hub; and the “proximity” effect for a dynamic collaborative work. The case study is not meant to be generalizable, but rather it is utilized here to inform theoretical development of the roles and benefits of triple helix intermediate organization.

Keywords: University research park, Triple helix, Intermediate organization, Centennial Campus.
Links established between public labs and industrial system: an Italian case Study

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Keywords: technology transfer; qualitative analysis; research-industry collaboration; National Research Council of Italy; interviews.

Due to the complexity of technology transfer quantitative analyses are not always able to represent the variety of its forms and evolution. In fact many forms of cooperation are better studied using a qualitative methodology based on the study of cases. This paper presents the results of a qualitative analysis performed inside the National Research Council of Italy (CNR), the biggest Public Research Organization of Italy, with activities covering all the scientific domains. The paper performs a deep analysis of specific cases of collaborations between CNR institutes and firms to highlight motivations, operational modalities and impact and importance of results. Its aim is to let emerge the factors of success, the barriers and the strategic position of CNR Institutes in supplying scientific knowledge. A fine selection of case studies has been performed prior to start the analysis, based on the criteria of continuity of relations across time and of importance at both technology and economy levels. All the studied cases are cooperation experiences repeated with time. Data collection has been performed via semi-structured interviews to both a researcher of the Institute and a responsible of the enterprise. The questionnaires were similar, and involving three main topics: description of the case study, modalities of the collaboration, evaluation of the collaboration. The survey did span 13 institutes and 15 firms. The results depend much on the dimension of the industrial partner and on their ability to perform research internally. The industrial side shows appreciation of the scientific level of researchers together with a strong criticism towards excessive bureaucracy, insufficient attention to the market and loose attitude towards confidentiality. The results of the survey are organized in a SWOT matrix and compared with on-topic literature findings.
Using the fuzzy-front-end in higher education: How European universities can better link their three missions.

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Keywords: Fuzzy Front End, entrepreneurial university, knowledge transfer, commercialization

Description:

During the last decades, there has been increasing interest in the role of the university as a key stakeholder and organization in the nexus of science, technology and innovation. In the face of new technologies, especially growing digitalization, and new societal and economic challenges, this paper proposes to reconsider the role of the university in the innovation system – especially the linkages of its three missions: teaching, research and transfer. More specifically, we argue that the university ought to take a more proactive role in Fuzzy Front End (FFE) processes of scientific knowledge production and transfer to improve the linkages between and the innovative relevance of the three missions.

Since the FFE – the early phase knowledge creation for innovation – is central in enhancing overall innovation processes, we stress that it is crucial that universities are familiar with FFE-related concepts to enrich the activities in all of their three missions. In this paper, we argue that academic researchers would benefit from awareness and knowledge of the FFE-concept, especially during research design, knowledge transfer and commercialization processes. Yet, university researchers often underestimate corresponding competences or lack respective interests. We thus provide suggestions on how future universities can benefit from FFE-approaches to connect their three missions.

The paper then strongly focuses on how university education can adopt FFE. Based on semi-structured interviews, focus groups and secondary data analysis, we place particular focus on the life sciences and engineering studies. We suggest that implementing early visions of commercialization into scientific education will aid the production and implementation of innovative knowledge and, in turn, ease commercialization processes of research. The paper, thus, hopes to bridge discussions between science and innovation studies and discussions around the entrepreneurial university. The paper also aims to trigger new discussions new policy implications for the future university.
University-industry collaboration and regional innovation

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Regional innovation policy is increasingly focused on the role of universities in generating innovation and regional development. The number of universities in the world has been growing rapidly, and universities are also increasingly keen to contribute to their regions. However, the geography of scientific research is highly spiky and there are strong Matthew effects in research funding. Furthermore, university-industry collaboration tends to be mainly regional, even more so than other types of innovation collaboration. Hence, the impact of university research tends also to be fundamentally local. This raises the question of whether a regional innovation policy focused on universities may exacerbate the currently uneven regional development trends in the global economy. In light of this, there is a need to examine how peripheral regions engage with universities. This paper examines the drivers of university-industry collaboration and its effects on firm innovation output. We first examine whether collaboration with regional, national and international universities is a function of characteristics of the firm or of the university. In particular, we are interested in how the quality of the local university affects the likelihood that firms will interact with local universities and with universities outside the region. We use Scopus data to develop a measure of the research quality at the local university in the field most relevant to the firm’s industry. Second, we examine the impact of university collaboration at different scales on firm innovation output. Finally, we test whether this impact depends on the research quality of the university. Specifically, we seek to examine whether universities that collaborate with local universities of a higher quality, also benefit more from university interaction.

Keywords: regions, university-industry collaboration, research quality, innovation
Are social communication channels emerging supplementary triple-helix relations? A Local Analysis in Spain through Twitter

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Abstract: Social communication channels are tools capable of emerge relationships among users based on thematic, personal or political affinities, reflecting also different communication strategies. Provided that these users belong to any of the triple helix (TH) entities, either directly (official profiles of universities, government or companies) or indirectly (individual profiles of researchers, politicians, Chief Executive Officers, among others), the analysis of these channels would reveal connections invisible to other classical techniques (bibliometrics or patentometrics). This would favour the fulfilment of new quantitative TH studies with alternative methodologies, based on the interrelationships through social media platforms. Specifically at Twitter, different types of non-symmetric interrelations between users can be presented (i.e., "follow" or "mention"), which can be quantified reflecting therefore different degrees of connection and communicative relationships.

This work proposes a categorization of the users (from a "triplehelicist" perspective) mentioned by the Tweets published by TH entities as a method to establish university-business-government relations, using the Catalan regional system in Spain (NUTS 2) as a case study. A local level has been considered to test whether social communication may be stronger in nearby environments, where universities could establish stronger relationships with their immediate environment (local industrial fabric, and regional government bodies).

To do this, four samples of Twitter accounts are gathered: a) universities; b) regional government institutions; c) companies; and d) citizens (classified according to professional TH membership). For each account, all Tweets published over three months are collected, extracting and classifying all users mentioned, together with a battery of users’ contextual metrics.

Results are intended to obtain potential communication patterns of each entity, the strength in the TH relationships from the aforementioned users, and the influence of the citizens professionally categorized in the analysis.

Keywords: Triple-helix; Spain; Twitter; Corporate communication; Mentions
Exploratory Study of the Level of Innovation in Brazilian SMEs

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Brazilian Small & Medium Enterprises (SMEs) represent over 96% of all active companies in the country. The view that the role of innovation in processes must receive special attention leads us to write this article, in order to measure the Level of Innovation in companies today. The Innovation Radar was used to support the model of the diagnostic method tool, which was established to perform a data analysis with the needs of each organization. Through this methodology, a sample of 33 SMEs in the manufacturing segment, in the south region of São Paulo was used for the research fieldwork, in place. The role was to diagnose in order to promote recommendations and collaboration, with the objective to improve the opportunities to be replicated in other organizations with similar challenges. The focus of the contributions of this work was related to the Dimension Processes, since most participants had results in common. This article’s main component is to identify opportunities for improvement and innovation in the Dimension Processes in the interviewed companies. It can be highlighted that small businesses have a lot in common, for example, most began as micro or family businesses, and after their growth, had financial gain, as well as an increase in the number of employees, etc.

The lack of strategic planning and strong management practices that aligned with the company's values, a context that was addressed in the analysis of the results, greatly limited the potential for innovation in Brazilian SMEs. A culture of innovation as a continuous process depends on robust management and on skilled and motivated employees, to power innovation as a means of stimulating the development of the organization.

Keywords: Innovation; SMEs; Level of Innovation; Industry; Process.
The importance of incremental innovation

The case of Sub Cutaneous Herceptin® - Trastuzumab

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Incremental innovation is conceived as the logical extension of an existing knowledge base (Henderson 1993). It is mostly concerned with progressive improvements in ‘user-friendliness, increased reliability, marginal additions to applications, expansions of capacity, and the like’ (Baumol 2005, p.36). In the context of the pharmaceutical sector, it involves improvements over existing drugs, i.e., the discovery of new therapeutic use, new formulations, paediatric use, or improved efficacy and safety (Yin, 2017).

Incremental innovation commands a large share of R&D investment in incumbent firms and is the mainstay of firms’ attempts to maintain and extend market share after the introduction of path breaking innovation (Bambury and Mitchell, 1995; Gaudry, 2011). Known as ‘evergreening’, it has become a valuable strategy for pharmaceutical companies struggling with the discovery and development of new drugs to extent revenue lines (Gassmann et al, 2013; Gaudry, 2011).

We adopt a case study approach to understand recent technological development in Trastuzumab (Herceptin®) a humanized monoclonal antibody originally approved by the FDA and EMA in 1998 and 2000 respectively for the treatment of a specific form of metastatic breast cancer (MBC) (Roskoski R Jr. 2014). The drug is at the tail-end of its patent protection whilst a new administration procedure has been patented by Genentech/Roche.

We problematized incremental innovation from a systemic perspective nuancing the commonly held view that incremental innovation moves along a technological trajectory originated by a radical innovation. The most important observation is that this process holds the potential to change the development of monoclonal antibodies for oncology.

Translating these results in terms of our theoretical framework we can see how significant incremental innovations are not just moving along the trajectory set out or originated by a radical/breakthrough innovation but may be shaping its dynamic and eventually plant the seeds of potential breakthroughs.
Personal networks and trust in public-private R&D projects: A case from Spain

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R&D public-private projects, where the public side is represented by universities and research institutes, and the private side is represented by firms, seem to emerge mainly from individual initiatives which are backed up institutionally when formalized afterwards. These university-firm collaborations are expected to enhance the innovation of products and processes in firms, which would lead to better corporate performance, and should cause benefits on regional development through economic growth and knowledge spill-overs. This study reviews the university-firm collaboration phenomenon and considers the case of Universitat Autònoma de Barcelona (UAB) and its collaboration with Henkel, a German chemicals company, which R&D activities in Spain are based on an open innovation strategy. An analysis using in-depth interviews of the collaborating parts and quantitative study of UAB-Henkel historical agreements has been conducted. Results show that this collaboration has impacted positively on the university, enhancing its involvement with industry and its collaborative research activities, and on the firm, allowing the development of new products and technologies that strengthen its performance. This interaction, which started with the creation of UAB’s Research Park, where Henkel established an R&D permanent unit, has been based on personal networks and trust rather than being an institutional initiative. The impact of UAB-Henkel collaboration on regional development is still unclear, however, this case serves as pathfinder for future research agreements among universities and firms in Barcelona region and beyond.

Keywords: R&D Projects; University-Firm Collaboration; Firm Performance; Regional Development; Personal Networks; Trust.
How are university-based medical innovations processed within a Triple Helix setting? The case of London

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Abstract: The Triple Helix model of innovation, university-industry-government collaboration, has been commonly referred to in the policy and strategy of governments in developing national and regional innovation systems. One fundamental statement in the Triple Helix model is that the triadic interrelations between government, industry and universities provide optimum conditions for fostering science innovations with the university undertaking a ‘third mission’ of economic growth, in addition to its research and teaching obligations, by leading on the generation of innovations. Although innovation and geographical based studies of the United Kingdom have explored the Triple Helix model from a macroeconomic viewpoint by measuring research network activity, regional innovativeness and intellectual property activity, little is known about how university-based innovations are processed within a Triple Helix setting particularly within the metropolitan city of London. The model implies that knowledge boundaries may be easily crossed however, in science related fields such as healthcare, research translation has been known to be context sensitive with the innovation process being spasmodic and non-linear owing to differing organisational structures, objectives and ideals across the different partners.

This thesis will apply a processual approach and explore how two top-tier London universities (King’s College London and Imperial College) generate and commercialise medical innovations within a Triple Helix setting and overcome informational, professional and cultural boundaries throughout the innovation journey. As such, this study has three implications. Firstly, it illustrates the influential framework of process studies (content, context, process) for telling a narrative or story about how the innovation process develops over time. Secondly, a processual approach has the potential to disentangle spatial (external) and non-spatial (internal) factors interwoven within the Triple Helix model particularly in a complexed and highly regulated system such as healthcare. Finally, it highlights the challenges and success factors that universities confront when responding to their ‘third mission’.

Keywords: (Triple Helix, universities, London, boundary work, medical innovation)
Foreign-born Professors in American Universities: How Immigration Status affects Participation in Triple Helix Dynamics

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Aims

We examine how the immigration status of academic scientists affects their professorial job duties, their scientific interactions with American government and industry, and their scientific linkages with home communities. Our core research questions include: 1) In what ways do the academic jobs of foreign-born professors differ from those of their native-born counterparts; 2) How does immigration status (naturalized, permanent, temporary) affect professors’ engagement with industry and government; and 3) Does a consideration of scientific linkages with home communities help to explain the lower participation of foreign-born professors in the triple helix of the American innovation system?

Methodology and Evidence

We analyze 2010 survey and curricula vitae data from 1427 professors working in 221 research universities in the United States (Netwise II). The disciplines represented in the Netwise II study are: Biology, biochemistry, civil engineering, and mathematics; oversampling of women and members of under-represented racial and ethnic groups allow for important controls. Preliminary analysis shows that foreign-born professors spend significantly more time on research, and less time on teaching and service or engagement with American government and industry, than their native-born colleagues. They are much more engaged with foreign colleagues in all three sectors abroad, suggesting a transnational aspect of the triple helix.

Relevance

How foreign-born scientists are integrated into the dynamics of domestic triple helix institutions is of vital interest in a rapidly globalizing scientific world. While industry and academe accelerate the flow of human and material knowledge production transnationally, processes of migration and immigration continue to be dominated by nation-state and multinational entities. Hence, the demands of knowledge production and capitalist development may be limited by these immigration structures, which are under pressure throughout the most developed world. In this macro-level conceptualization, the government may exert larger influence in the triple helix than those of industry or academe.

Keywords: globalization of the scientific labor force; immigration and science; American academic careers
The German science and research system is characterized by a broad, differentiated structure, and research is conducted in a variety of public and private institutions. During the last years major changes in the political and economic arena as well as in the societal sphere are driving the transformation of R&S infrastructure in Germany. At the same time digital technologies move in a globalized mode and change the industrial landscape through a new division of knowledge production and use. Both streams challenge legal frameworks, institutional settings, respective players and established innovation schemes of the German research landscape. Due to these changes we experience a new German Innovation Policy that manifests itself in experimental program designs, funding of social innovations and even in constitutional changes to fund universities, and to facilitate interdisciplinary and translational research. The new policy paradigm of putting the innovation system to work for society, and industry - and set it on a competitive track is juxtaposed to a former approach that supported technological development paths and did rarely question existing organizational constellations for basic research and applied sciences. We illustrate the structure follows strategy approach for Germany’s largest scientific organisation the Helmholtz Association with 18 scientific-technical and biological-medical research centres and more than 38,000 employees and an annual budget of over 4 billion Euros. The study shows the creation of a new integrated research field for earth, marine, environment and climate research bundling competences, resources and infrastructure of different Helmholtz research centres and partnering universities. Our research is based on data gathered in a strategy and organization project carried out in the years 2015 to 2017. It includes expert interviews and action research flanked by data analysis in regard to funding patterns and programmatic changes. We employ a policy analysis to structure our research and use the viable system model (Stafford Beer) as a heuristic to validate functionality of the new organisational design in regard to the objectives.

Key words.

German National Innovation System, Helmholtz Association, German Innovation Policy, Viable System Model, Innovation Ecosystem Germany, Organisational Change

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University campuses as living labs: Challenges of 'multiple matching'

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In the paper, living labs are seen as an innovation methodology, in which different actors aim to match new (technology) solutions with the needs of users. Living labs have started to blossom since the early 2000s, in particular in solving (urban) sustainability problems, like in housing, elderly care, refurbishing functional buildings (hospitals; shopping malls). The role of universities has emerged somewhat later and has now been embraced in many on-campus living labs. However, virtually nothing is known about opportunities and threats specifically faced by on-campus living labs.

Against this background, the paper maps and analyses the types of involvement of universities, the benefits foreseen, and challenges that are being faced. In terms of benefits, the analysis has a focus on the ability of universities to contribute to urban sustainability. Previous research (Van Geenhuizen 2018) has indicated at least three specific ‘matching’ challenges: to match local rules and regulation, to create on-campus conditions matching real-life of users, and to match with the needs of the city (citizens), in order to keep them ‘feeding’ the living lab with new problems as well as enabling a further testing in the city. The paper reads as follows. First, living labs will be characterized and contextualized, and theory of change guiding the research, will be presented. Next, the three ‘matching’ challenges are investigated in-depth using recent literature and three case-studies of on-campus living labs. The case-studies draw on in-depth interviews with local and external experts, in analysing the type of university involvement, the aimed benefits of the initiative, the strength of the ‘matching’ challenges being faced and ways to remove obstacles. The paper ends with a discussion of critical factors in dealing with the challenges.

Keywords: living labs, university, campus, matching
Providing doctoral skills to the regional labour market: Cases of University relations with Science Parks

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Universities are the only providers of doctoral skills, that are generic and specific skills acquired during doctoral training, such as research project management or scientific expertise. Doctoral education had in the beginning been designed to answer the needs of academia essentially. However, in the recent decades, more doctorate holders find employment outside academia. Doctoral education thus seems to be one of the tools of universities to have an impact in the development of their regions, for example when their graduates get employed locally. The objective of this study is to explore how the needs for doctoral skills are anticipated by local employers, and how universities answer those needs. Science and Research Parks situated next to universities were chosen as cases of study. In such parks, employers are local, and most of them conduct R&D activities that call for doctoral skills. Interviews were conducted at a new Science Park in Sweden and at an established Research Park in Spain. Both of these cases have adopted Triple Helix configurations. In Sweden, the municipality, the local campus of a university, two multinational companies and several small companies are involved in the Science Park. In Spain, the Research Park is part of the campus of the university, and its members are mainly small companies and public research institutes. Interviews will be analysed using the Gioia methodology. Similarities in the two cases will be looked for. Discrepancies are also expected, as cases differ in age, configuration, geography and culture. These cases will highlight implications for several stakeholders: university managers and doctoral schools in adapting the curriculum of doctoral education, for company leaders in anticipating their needs and communicating with universities, for policymakers in designing labour market policies for instance and for doctoral students themselves in the building of their own education and career path.

Keywords: Science parks; doctoral education; labour-market; skills development
STI policy evaluation in Russia: existing and new approaches

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Abstract
Nowadays policy evaluation has become one of the critical issues in STI governance. A vast array of literature suggests various theoretical frameworks and discusses the results of practical evaluations. However, there are few studies describing how evaluation procedures are planned and carried out, which mistakes government administrators make, and what they learn from them. In particular, there is scarce data on the evaluation of STI policies in developing countries and countries in transition. This paper sheds light on how these procedures are carried out in Russia. Four case studies of STI policies’ evaluation in Russia are presented, as follows:

Case 1. Innovation programmes of the largest state-owned enterprises.
Case 2. ‘Efficient contracts’ with researchers.
Case 3. Establishing innovative spin-offs at universities and research institutions.
Case 4. Supporting engineering and industrial design sector.

The cases are selected to describe different policy tools with different aims. They are designed based on the analysis of legal documents, statistical and administrative data, as well as interviews with various stakeholders.

Also, the original approach to measuring business climate in science is described, based on the methodology of business tendency surveys. We argue that this approach provides new opportunities for policy evaluation worldwide, and illustrate it with the results of the 2017 survey of 360 R&D performing organisations in Russia.

In the concluding section the shortcomings of the evaluation procedures revealed in the case studies are outlined. The recommendations for the improvement of evaluation processes in Russia are provided.

We believe that such illustrations as shown in this paper might be useful for other developing nations to learn from others’ mistakes and find new ways to improve STI governance.

Keywords: STI policy evaluation, business climate, Russia
Recent studies (USPTO 2012 and 2016; OHIM 2013 and 2015; EUIPO 2016) have shown that IPR-intensive industries have a higher than average propensity to create new jobs and also display a higher exporting activity. In this paper we analyze the relevance of those IPR-intensive industries in Brasil, a country that has undergone several economic, structural, social and political changes in recent decades. Data on the innovation potential of Brazilian industries show that business firms have decreased their internal R&D investment while increased the acquisition of R&D services and other external knowledge through the licensing of patents both from universities, research institutes and other firms (PINTEC 2016). Our analysis covers all patent applications of Brazilian origin deposited in the Patent Cooperation Treaty (PCT) in the period 2007-2015, totaling 3,218 patent documents. In this study we constructed a database with patents, business firms details and their sectors relying on three different sources: 1) Espacenet, the EPO’s patent database; 2) SRFB, a database from Brazil's Ministry of Finance and that provides information at the individual business company level; and 3) IBGE, the Brazilian national statistics office, from which we draw information regarding employment, valued-added and export content at the aggregated sectoral level. To relate the information from these different sources we used a correspondence that has been applied in earlier studies and that relates the technological International Patent Classification of individual patents to the economic classification (ISIC and / or NACE) of the sectors firms belong to. The results achieved are pioneering in what regards Brazil. They show a pattern largely in line with what has been found by the earlier international studies.
A triple helix model of regional renewal: Ontario’s automotive industry in the digital age

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Five major automakers operate in Ontario, but until recently the research and development for North America was performed almost entirely in Michigan. This changed when the development of connected and self-driving cars led automotive companies to draw on Ontario’s strengths in information technology (IT) fields such as sensor-based systems and high-resolution mapping. The paper details the historical dynamics of how policy actors deployed the triple helix paradigm to establish the knowledge infrastructure which has made Ontario a region where automakers and tier-1 suppliers augment their IT capabilities. Policies evolved from a focus on funding collaborative R&D, to include coordination-oriented initiatives to flank and modify company-regional actor relationships.

Public funding helped grow a rich body of expertise in the higher education sector on how computers and telecommunications can transform the automotive domain. It encompassed a collection of individual, very loosely coordinated policies from both federal and provincial sources. Foreign automotive R&D investment started taking shape in the 2000s when funding incentivized universities to perform automotive research in collaboration with industry partners. R&D funding also began to target existing and startup IT firms entering the automotive market, further enriching the pool of technologies and labor automakers could draw on. Across the board, university-industry R&D alliances have been the result of bottom-up experimentation of university leadership to promote a more direct involvement of universities in research-based innovation.

The decentralized policy-making and implementation created silos of resources at universities and companies, leading to policy experimentation to address network failures. Assemblers lack a full overview of and linkages to regional resources, given the relatively recent establishment of R&D operations. A response has been the proliferation of policy actors that identify resources and partner organizations, thus acting as institutional or associational entrepreneurs. They have identified strategies that can be used to create relationships between the automotive companies and the regional information technology actors. Policy experimentation aligned with the changing needs of triple-helix actors has given Ontario a chance to compete for a position in emerging automotive supply chains.
The Role of Organizational Factors in the Context of University Knowledge and Innovation Transfer

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Research aim and relevance

The study addresses the following research question: How do organizational factors of research units affect knowledge and innovation transfer in public universities? Scientists’ engagement in different formal and informal activities (referred to as academic engagement) is recognized as an important channel for knowledge and innovation transfer to industry (D’Este and Perkmann 2011; Abreu and Grinevich 2013; Perkmann et al. 2013; Tartari et al. 2014). However, research on academic engagement concerning the influence of organizational factors is still fragmented (Perkmann et al. 2013). Our study addresses this research gap by developing and empirically testing a research model, which proposes that organizational factors of a research unit enhance university scientists’ academic engagement. In particular, we examine the influence of research units’ entrepreneurial orientation and network capabilities. Previous research point towards a potential impact of research units’ strategic posture and network determinants on scientists’ individual engagement in different activities (Haller and Welch 2014; Kalar and Antoncic 2015).

Methods

To examine the proposed relationship we draw on a dataset of 1.400 German university scientists. We applied an online survey to empirically validate our research model addressing scientists in departments with high relevance of university knowledge and innovation transfer. We used established constructs and conducted hierarchical regression analysis preceding reliability and validity tests for self-reported data.

Findings

We found that research units’ entrepreneurial orientation and network capabilities have a significant impact on scientists’ academic engagement. We thus verify the importance of the associated research unit on university scientists’ activities.

Implications

Our results offer interesting insights for scholars and practitioners. The impact of organizational-level determinants on university scientists’ is crucial for knowledge and innovation transfer. To understand the mechanisms of these determinants is important for the creation of supporting structures to enhance university-industry relations.

Keywords: University-industry relations; university scientists; innovation transfer


Cooperating with different types of non-academic organisations: implications for university-industry collaboration in peripheral and metropolitan regions

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This paper explores how non-academic partnerships (collaborative relationships with non-academic organisations such as other firms or technological institutes) can facilitate university-industry collaboration, in different regions. In particular, I study whether businesses in peripheral regions are more likely to collaborate with universities if they cooperate with Danish non-academic partners; and whether businesses in metropolitan regions are more likely to collaborate with universities if they cooperate with foreign non-academic partners. I also study whether cooperation with Danish non-academic partners is more conducive to collaboration with Danish universities in peripheral regions; and whether cooperation with foreign non-academic partners is more conducive to collaboration with foreign universities in metropolitan regions. The insights from this paper might help understanding how does collaboration with different organisations stimulate university-industry collaboration, in different types of region. I combine data from the Danish integrated labour market database, and the Danish innovation survey. This dataset is used to run a series of logistic regressions on the likelihood that firms collaborate with: universities in general, Danish universities, and foreign universities. For firms in peripheral regions, collaborating with Danish non-academic partners is more conducive to university-industry collaboration in general, than for firms in metropolitan regions. Secondly, cooperation with foreign and Danish non-academic partners is positively associated to collaboration with foreign universities, independently of firms’ regional location. Finally, cooperation with Danish non-academic partners increases the likelihood that firms collaborate with Danish universities, independently of businesses’ regional location. The findings suggest that there are different paths to university-industry collaboration, and to different types of universities. Policies aimed at promoting universities’ third mission could take into account how firms’ choice of non-academic collaborations influences their choice of university partner.

Keywords: university-industry interaction, peripheral and metropolitan regions, non-academic partners, geography of collaboration
Implementing the National Technology Initiative in oil-rich Russian regions: “Nudging” and forced collaboration

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In the recent years resource-rich countries have launched special policy measures to foster innovations (Frenkel and Maital, 2014; Kuhlman and Ordonez-Matamoroz, 2017).

Russia is a special case among those countries. Obviously, Russia enjoys the plenty of natural resources that make it similar to a typical “rentier state”. On the other hand, Russia has a long record of scientific advancements and has high rates of tertiary education involvement. It stands 45\textsuperscript{th} in the Global Innovation Index, higher than almost all the other resource-driven economies (https://www.globalinnovationindex.org/analysis-economy).

This contradiction is reflected in the country’s innovation policy. Many factors inhibiting innovations inherited from the Soviet past are still relevant (Gokhberg, 2016). However, Russian government despite intensive anti-Western rhetoric has launched a number of nation-wide programs that harness the latest concepts of innovation policy including the Triple Helix.

One of the brightest examples is the National Technology Initiative (NTI) – a program that aims to create hi-tech niches such as unmanned transportation, smart grids, digital health, etc. (http://www.rvc.ru/en/nti/). The NTI is a rare example of the “demand-driven approach”: it is designed by business leaders and is based on their perception of market demand for hi-tech products.

The program is noticeable for involving all the players: federal and local governments, corporations, universities. It is implemented across the country including peripheral regions rich in natural resources but lacking human capital. The authors examine the following issues related to the cooperation between the sides of the Triple Helix under the umbrella of NTI:

- Incentives for the universities to engage in consortium-like collaborations with business.
- Role of the resource extracting corporations in regional ecosystems. How corporations are forced to reallocate funds under the framework of National Technology Initiative.
- Applicability of the Triple Helix model to an environment where changes are initiated by government and face resistance from other players.
Entropy and systemic interaction in the aerospace industry of California

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The historical, economic, political and sociocultural conditions of California have consolidated this region as one of the most relevant and paradigmatic centers of innovation in the aerospace industry in the world. The innovation system developed in California possesses autochthonous qualities that are the product of particular dynamics where the relations between university, industry and government provide three fundamental resources (a) human capital; (b) knowledge based on research; and (c) specific projects for the development of innovation (Islam & others, 2010, Dosi, Marengo, & Fagiolo, 2001, Etzkowitz & Leydesdorff, 2000).

In this context it is necessary to identify the mechanisms of interaction that configure and maintain collaboration networks between University, Industry and Government.

Based on the study of the relationship between University, Industry and Government in a regional innovation system, their interaction mechanisms will be described and defined and how this contributes to sustaining a triple helix model with three outstanding conditions: (a ) has a significant number of universities ranked in the best ranking of aerospace engineering programs ("QS World University Rankings by Subject 2014 - Engineering - Mechanical, Aeronautical & Manufacturing | Top Universities", 2014); (b) the innovation ecosystem places California as the most important aerospace cluster on the planet (ATKearney, 2014); and (c) at the national and international levels, it concentrates the largest number of R&D+d projects and the concurrence of government funds aimed at generating innovation (ATKearney, 2014, Crawford, 2011).

The present work offers the preliminary results that describe and analyze the interaction mechanisms between university-industry-government from the procedure proposed by Leydesdorff, Park and Lengyel (2013); using a statistical model derived from Shannon's entropy in his theory of information (Shannon, 1948). The model uses a triple entry matrix that allows determining the entropy in the interaction of the variables and has been used by Leydesdorff and others as a statistical test of the levels of uncertainty within triple-helix systems of the contemporary innovation industry (Leydesdorff et al., 2013; Park & Leydesdorff, 2010; Carlsson, 2003; Cohen & Levinthal, 1990).

California was divided into nine economic regions. The units of analysis that integrated the information of the model were: (1) number of linking projects for research, development and design between university and industry; (2) number of government funding funds for research,
development and design projects; (3) academic programs that have R & D projects with industry or government.

The preliminary results show that:

1. Of the 2,156 contracts, subsidies, research and development projects and projects linking the industry, universities and federal government of the nine economic regions of California, the percentage of those corresponding to units without reciprocal information are: 14.05% to industry, 0.46% to government and 1.3% to universities; whereas the percentages corresponding to binomials of units are: 42.53% to government-industry, 25.46% to government-university and 11.5% to university-industry; while 4.68% corresponds to units with government-industry-university relationship.

2. Southern California is the region with the highest interaction between government and industry with 26.25% of total relations, followed by Southern Border with 23.97 and Bay Area with 23.36% of the total.

3. The greatest contribution to the interaction between industry and university is generated by Southern California with 26.4%, while Southern Border with 24.66% and Bay Area with 21.02% provide the second and third highest levels of interaction. Greater Sacramento appears in a fourth level of contribution with 20.01% of the total.

4. Also in the interaction of the government-university binomial Southern California contributes 32.94% of the total interaction, while Bay Area and Southern Border contribute 32.82% and 20.84% of the interaction.

5. In the three-axis interaction of the Bay Area model, it has the greatest contribution to the system with 33.11% of the interactions, followed by Southern California with 29.44% and Southern Border with 24.87%.

References


Open innovation and digital technology as a business strategy in a large Canadian ICT firm

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The purpose of this paper is to study adoption strategies of open innovation (OI) and its role on a firm’s performance based on three of the four dimensions of the quadruple helix model (industry, university and society). We use a case study approach designed to deep dive on the large firm’s innovation practices and its interactions with its customers, key partners and university researchers. We first observed and participated during a period of 8 months with a team that was put in place to work on a specific project designed to solve a challenge. We then conducted a focus group with the core team members to understand challenges and lessons learned. Finally, we surveyed executives and key stakeholders to fill in gaps of information.

Initial observations show that the studied firm used OI practices so that partners could join the project team alongside other firms as well as researchers. This allowed increased trust as well as the empowerment of the team members which allowed a faster resolution and implementation of new projects. Executives were only present to remove any obstacles the team encounters. One the main enablers to increased innovation was the adoption of digital technologies that kept the team connected despite working in five different cities across North America, Europe and Asia.

The results contribute to the open innovation literature by providing a real example on implementing the paradigm in practice based on the quadruple helix model. The paper also demonstrates that despite not being the main type of open innovation used by large firms, inside-out open innovation can have high implications innovation performance if used with external partners and university researchers. Key recommendations and strategies are provided to large firms and to policy makers to encourage and enable these practices in the future.

Keywords: Open innovation, quadruple helix, digital technologies
Instability as driver for industrial change? The example of ambiguities in the concept of Industry 4.0

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The digitization of industry is in full swing. It is driven by visions of highly industrialised mostly western economies to increase their competitiveness, though a clear definition of such visions does not exist. However, crucial actors in this field such as the German public-private initiative “Plattform Industrie 4.0” (www.plattform-i40.de) and large industry companies do even talk about the “4th industrial revolution”. Irrespective whether it is the next industrial revolution or not, it is quite obvious that deep socio-technical transitions are currently ongoing. In the “multi-level perspective” (MLP) Geels & Schot (2007) describe the instability of socio-technical regimes – often caused by shocks from the external landscape – as an opener for innovations which are developed in niches. The stable level of the landscape and the dynamic level of the niches can be easily transferred to the example of Industry 4.0. However, the dynamics on the regime level are more difficult to detect. For that reason the question raises what keeps the instability on the regime level beyond the appearance of a new technology and which opportunities and requirements do occur to push the socio-technical change?

In order to shed light on this question the concept of Industry 4.0 is outlined and narrowed based on an extensive document analysis of crucial actors in the field. Different ambiguities within the concept Industry 4.0 are identified as instabilities in the current socio-technical regime; such as the national focus on growth and the requirement to interconnect global value chains. These ambiguities are critically discussed as opportunities and challenges for a socio-technical change that goes beyond national growths agendas but integrates societal challenges. They build the basis for a framework for future research and might be complemented with first expert interviews.

Keywords: Industry 4.0, socio-technical change, multi-level perspective, societal challenges
Internal and External SME-university interaction determinants: Empirical Evidence in a Transitional Economy

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Small and medium enterprises (SMEs) and entrepreneurial universities are considered as the main sources of innovation. The purpose of the study is to identify the determinants that trigger interactive activities between SMEs and universities, and innovative and R&D activities in Kosovo. Through the integrative approach, the study empirically investigates the impact of three sets of SME factors on SME-university interaction, innovation and R&D activities, such as management, firm’s characteristics, and institutional environment factors. Management and firm’s characteristics are considered as internal determinants, whereas institutional business environment is considered as external determinants. Management includes education, age, and the level of property delegation to the managers, whereas firm’s characteristics include size, age, import-export status, and sector. As external determinants are those institutional business environment factors and variables which may hinder the SME-university collaboration, innovation, and R&D activities, such as market structure, corruption, informal economy and access to finances.

Most of the analyzed determinants are significantly positive in developed economies on SME-university interaction, and innovation and R&D activities, whereas in the developing countries most of the determinants are not significant. Factor analysis and probabilistic logit model is designed to research the impact of managerial factors, firm and institutional environment on SME-university interaction, and innovation and R&D activities.

**Keywords:** SME, Entrepreneurial University, Innovation, Interaction, R&D
Converting the potential": Patenting and Commercializing, A Fuzzy set Analysis of Canadian Technology Transfer Offices

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In the Triple Helix of University-Industry-Government relations, universities play a catalytic role of the innovation process by feeding companies with inventions. Precisely, universities assume the first steps of the innovation development, from scientific discoveries to their transfer through specialized structures, of which the technology transfer office (TTO) is an emblematic example. Whereas political reforms over academic inventions have spurred the growth of TTOs as a key actor of entrepreneurship policies, many universities have already established the TTO as a monopoly, centralizing all the disclosed inventions. TTOs’ staff members have to assess the inventions’ potential, to secure their Intellectual Property Rights (IPR) and to commercialize them. However, while the literature offers insights on the individual side of academic entrepreneurship, documenting determinants of faculty efforts to patent and commercialize, less is known about its organizational side, i.e. the TTOs. Moreover, while the literature on TTOs activities has been dominated by empirical approaches mostly based on case studies, no identified quantitative studies have attempted to explore the determinants of TTOs patenting and commercialization. Based on a fuzzy set analysis (a method which bridges a gap between qualitative and quantitative approaches) of 34 Canadian TTOs, the objective of the paper is to explore the conditions under which TTOs secure and transfer IPRs. Drawing on the resource-based view of the firm, we explored the effect of four types of resources (institutional, financial, network and human) on both the grant of patents and the commercialization of IPRs. For example, regarding human resources, the results show that when TTOs employees who hold an engineering degree are important to secure IPRs, those who hold a management degree are important to commercialize them. The paper ends with implications regarding organizational interactions or else recruitment strategies of TTOs to convert the potential of academic inventions.

Keywords: Intellectual property rights, Academic entrepreneurship, technology transfer office, Fuzzy Set Analysis
Revisiting contemporary literature on universities’ third mission activities from the perspective of inclusive development

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Abstract

The aim of this paper is to give an overview of how the concept of ‘universities’ third mission’ is defined and operationalised in various bodies of literature emphasising universities’ societal engagement beyond teaching and research. Special focus is given to third mission activities targeting inclusive development. The review draws on contemporary contributions from Triple Helix, Quadruple Helix, Entrepreneurial University, Civic and Engaged University, and the Developmental University. The range of activities so far labelled under the umbrella of third mission is very uneven in terms of coverage, but in general the direct economic output generating third mission activities get more attention, while social and cultural presence and efforts are more limited. A substantial share of the literature is from and about third mission activities in Europe and US and fewer studies exist on how universities in developing countries or in emerging economies are responding to increasing demand for universities to engage in transformation towards more inclusive and sustainable societies. The adoption/extension of universities to third mission activities is a process that depends upon the historical functions and contextual factors in which the universities are located and have been operating. The paper concludes with reflections on how different approaches to universities’ third mission activities can be further developed and applied to better understand the role of universities for societal engagement and inclusive development. One issue to be addressed in this context is the complex interrelations between the third mission and the education and research as primary missions.

Keywords: Universities’ third mission, inclusive development, literature review
The Triple Helix Configuration of Science Parks in Indonesia

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The lack of evidence on the impact of science and technology parks (STPs) on economic development has not diminished interest in the adoption of this concept as a regional policy instrument. In 2014, the Indonesian government targeted the building of 100 STPs in 5 years under the coordination of seven national ministries/institutions. These STPs were envisioned as science and technology down-streaming vehicles to encourage regional economic growth through the spread of growth centres in a framework of equitable distribution between territories.

Indonesia’s top-down approach, with its dominant government role, has encountered obstacles. The target of 100 STPs was revised to 22 STPs in 2016, but eventually became 66 STPs by the end of 2017 after the issuance of a presidential decree on Science and Technological Clusters. This cluster policy encouraged bottom-up approaches where university and private institutions would be more involved.

This paper draws on research conducted by analysing policy documents and interviewing STP stakeholders in Indonesia at the national level and in 16 science parks at the regional level. The research finds that there is a distinctive institutional logic affecting the policy implementation of Indonesia’s STP program. At the regional level, instead of following top-down policy, Triple Helix configurations have emerged in different ways and influenced by many factors.

The evolution of policy in term of actors and approaches in Indonesia demonstrates that in policy transfer there is an institutional logic which needs to be consider and where one size does not fit all. The paper further contributes to understanding the non-western context of Triple Helix development and the influence of institutional logic differences.
Using a multi-trait multi-method matrix to validate innovation indicators build from organisations’ websites

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Data is often hard to come by and organizations are increasingly solicited to answer surveys and participate in interviews. In this exploratory study, we use a web mining technique to source data in order to create innovation indicators of Canadian nanotechnology and advanced materials organisations and help to overcome surveys issues. 79 websites were extracted and analysed based on keywords related to the concepts of R&D and intellectual property. To validate what our web mining indicators actually measure, we compare them with those from a classic questionnaire-based survey. Formative indices from the surveys variables were built to better represent all the possibilities resulting from the web mining indicators. To ensure a convergent and discriminant validation of our results, we performed a Multi-Traits Multi-Method (MTMM) technique. Our MTMM matrix lead us to conclude that the formative indices are a good representation of the web mining indicators. As a consequence, the data extracted via our web mining technique can be used as proxies for the relative importance of R&D and the importance of IP, which would have previously only been measured using conventional methods such as government administrative data or questionnaire-based surveys. The self-reporting bias induced is inevitable but it is as much a quality as a flaw, in that it provides insight on how an organisation wants to be perceived. Organisations write on their websites about what they care about, what is important for them and who they are as an entity. This qualitative information could potentially be used as a proxy to understand an organisation’s culture which can help to catalyse potential Triple Helix collaborations. Future research will assess how these indicators can be used in actual regressions and assess whether these web indicators tend to be substitutes or complements to the traditional measures use in innovation management studies.

Keywords: Multi-Traits Multi-Method, construct validity, Web-mining, innovation measurement
Commercialization of knowledge VS basic research in Serbia

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Abstract: The main objective of this research is to show if increasing and encouragement of knowledge commercialization and university research will not negatively affect on the quality of basic research and the traditional knowledge base. A special review will be dedicated to the environmental research issues. The relevance of resuming this research is in underlining the fact that the number of applied and developmental research will not negatively affect fundamental research. Entering the sphere of knowledge commercialization, along with the good governance of development and scientific policy, we can enable additional investment in research to the countries in transition. A very important issue, which also opens up a discussion with the quadruple helix model is how an academic scientist can take the best advantage of entrepreneurial opportunities provided by asymmetries of knowledge. For this research relating to the connection between applied, developmental and fundamental scientific research in Serbia, we used the method of Spirman's coefficient of ranking correlation, since these three variables deviate from normal distribution. The data for this research were collected from the Statistical Office of the Republic of Serbia, in period 2006 – 2015. The findings of conducted research had the focus on the number of applied scientific research, the number of developmental scientific research and the number of fundamental scientific research. It was intended to determine the relationship of these three groups of scientific research, what is their distribution across sectors, as well as in different branches and fields of science. The implications of the closer connections between business and educational sector, and on the other hand - state and educational sector (two sides of quadruple helix model) are visible in the increasing number of applied, developmental and fundamental research in all these sectors in Serbia.

Keywords: knowledge commercialization, environment, quadruple helix model, research policy

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Local economic development and the Colombian strategy for a sustainable and inclusive bioeconomy.

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Keywords: Bioeconomy, Local Economic Development, Sustainability, Triple Helix.

This paper investigates the relationship between Triple Helix actors of industry, government and universities in Colombia in the context of strategies for promoting sustainable and inclusive bioeconomy models. Colombia joined the OECD in 2018 despite great political, economic, social and cultural differences the country and other members of the organization. Progress has been made on a range of issues, but there remain challenges of developing strategies to strengthen the productive potential of the country to generate more and better opportunities for local economic development. Colombia enjoys a broad and diverse base of natural resources, including land, water and biological diversity together with an emerging economy and availability of human resources. However, its economy is still very dependent on extractive industries and the primary sector. Moreover, social and economic inequalities between the 1,122 Colombian municipalities challenge the joint growth of the regions. This paper explores opportunities to leverage new bioeconomy strategies for sustainable local economic development in Colombia. The research analyses information from Triple Helix actors in Colombia about the bioeconomy, local economic development, and interactions among these actors to drive bioeconomy strategies. Three key questions are explored: What are the interactions between Triple Helix actors in Colombia to motivate advances in bioeconomy? With the advances that exist in the production of the bioeconomy in Colombia, is it possible through bioeconomy strategies to generate local economic development? And, what are the scope and limitations of bioeconomy approaches in the search for local economic development? After probing these questions, local and national level policy implications for integrating bioeconomy, sustainability, and local economic development through Triple Helix strategies are examined.
The formation of impact strategies by universities: the case of the Social Sciences and Humanities

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Keywords: Universities, Governance, Strategy, Impact, Social Sciences and Humanities

This paper aims to unravel the development and implementation processes of societal impact strategies of universities. What signals in their environment influence their strategies? What are their goals for societal impact? And how do they aim to realize these goals? Are strategies deliberate or emergent?² Are the answers to these questions the same at different organizational levels? Available studies provide insights on published university impact strategies at the university level³ and on the effectiveness of specific elements of these strategies⁴,⁵, but have not concerned the processes that lead to strategy formation and implementation. In other words, we do not yet fully understand how universities govern their role in the Triple Helix.

This study focuses on the social sciences and humanities (SSH), as despite their importance in innovation⁶, they are still underrepresented in the impact literature⁷,⁸. It takes an international comparative case study approach of two universities in the UK and two in the Netherlands. A comprehensive university and a university specialized in SSH are selected in each country. Not only leadership at the central level is interviewed, but also leadership at faculty and department level. In addition to leadership, support staff such as policy advisors are interviewed. Furthermore, policy documents are analyzed.

The results of this work in progress will provide insights on how 1) universities respond to impact demands in their environment, including government, industry and the public sector, in strategy formation and 2) implement policies and programmes to realize their strategies. Preliminary results include that strategies are not necessarily aligned throughout a university; that communication about impact strategies between leadership and support staff is not obvious and that universities expect financial contributions from knowledge users. The study will result in recommendations for the improvement of strategy development and implementation.

Aim and relevance – The objective of the research is to present novel process and status models as possible new methods to apply and quantify helix models in real-time environment in the Central and Eastern European region.

Methods – The scientific approach is based on basic concepts of recent innovation models and evolutionary economic geography. Research generally focuses on one or two aspects of embeddedness, for example innovation, social or institutional embeddedness. The current research examines embeddedness from a complex, multidimensional perspective that has not yet been applied in this context. The author adapted, further developed and quantified the quintuple (penta) helix model to study corporate embeddedness of three companies (Audi, Mercedes and Robert Bosch) in Hungary.

Findings – The research established that helix models can be operationalised, adapted and quantified in real-time environments in the CEE region, and thus, a new method and metrics could be introduced to TH research based on corporate embeddedness. Contrary to previous studies, the current research focused on the ever-changing relationship of transnational companies and their environments with the identification of the specific milestones, phases, characteristics, dynamics and the selective nature of the processes.

Practical implications – The developed models can form a sound and innovative basis for comparative analyses and methods to study TH, policy recommendations and specific interventions. The identification of the specific milestones and characteristics of the processes provides a unique opportunity to policy makers to elaborate tailor-made interventions and policy recommendations.

Originality – The quantification of helix models, especially with a comparative methodology, has been very unique in previous studies. The current research examines helix models through corporate embeddedness in a real-time environment with a complex, new perspective. The geographical scope of the study (CEE region), its focus on the local (meso) level, its process-based approach and comparability are also original contributions to current state-of-the-art.
Social innovation landscape in Europe: preliminary results from case studies

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In the last decade, social innovations have become a widely used concept in policy agendas and academic research. In light of budgetary constraints and a considerable number of governments’ responsibilities, social innovations are seen as a crucial instrument in addressing regional level problems with lesser financial resources.

The European Commission defines social innovation as ‘development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or collaborations; social innovations are not only good for society but also enhance individuals’ capacity to act’. Despite the popularity of the concept, there is lack of coherence in its understanding. Social innovations vary from projects are associated with direct tangible and intangible benefits for society (e.g. projects for refugees, lonely mothers) to projects that bring indirect social impact (e.g. open data, Fair Trade).

There is an uneven distribution of social innovations. While counties such as the UK, Italy, Germany show the most substantial number of projects, countries with advanced economies of Northern Europe and developing countries of Eastern Europe have relatively the same number of social innovation projects despite the differences in economic development among them.

The current research aims to investigate how social innovations emerge and evolve in places that possess different innovation capabilities, culture, governance structure and economic conditions.

The research focuses on five European cities: Manchester, Stockholm, Utrecht, Sofia and Budapest. The research presents initial results of case studies primarily based on the interviews carried out with social innovators and representatives of city councils or any other organisations involved in the initiatives. The emphasis is put on how metropolitan and regional context, national support systems and cultural features that influence social innovation landscape.

Keywords: social innovation, social innovation landscape, metropolitan development
Understanding Conditions for Impact of Scientific Knowledge on Transport Policy in the City of Manchester

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Within the literature on triple helix, attention is mostly paid to the support of innovative enterprises from government or universities. This paper will shift attention to the academia-government link of the helix, which is to date largely overlooked in the triple helix community. Having strong links between academia and public decision making bodies is essential for informed policymaking at city-regional level.

Studies that to date have analysed academia-government links mostly emphasise the need for university scientists to produce ‘impact’ on policymakers. In contrast, we stress that the capacity of policy making organisations to search, absorb and use scientific knowledge is critical, and differs between policy organisations. This paper presents preliminary findings of an on-going, longitudinal qualitative study of the Manchester City Council (MCC) and its transport policy. We apply a tailored neo-institutional framework to understand in detail how organisational and institutional conditions within MCC shape the way MCC engages with and uses scientific expertise to frame the transport and related societal challenges, to develop solutions and to implement them.

MCC is thought to be one of the most entrepreneurial city councils in the UK, driving the vision of Manchester’s future as a clean, sustainable and smart city, and continuously experiments with pathways for this transition. However, Manchester also has some complex challenges that need urgent solving and require input from all Triple Helix actors in the city, such as, within mobility and transport theme, congestion, air pollution, poor conditions for walking and cycling, and accessibility.

The study contributes to better understand the dynamics of science-policy interaction of the concrete MCC case, but more generally offers a framework to make sense of the science-policy nexus from the perspective of knowledge users in the policy making arena.

Keywords: impact; science-policy; university-government; cities; urban mobility
Storylines: emerge from and shape complex socio-technical systems

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Stories often seem to have a beginning, a middle, and an end, and exist in relative isolation. This applies to stories about people as well as companies, technologies, industries or anything else. Stepping back, stories about individual people, companies, technologies or industries can also be seen as elements that overlap, interact and repeat, without clear beginnings or endings. As such, stories reveal recurring themes, familiar sequences of events and typical ‘storylines’.

Storylines are characteristic structures that emerge from iterative interacting stories and that contribute to how individual stories are identified, told and used. In this way, storylines grow stronger or weaker according to their usefulness for understanding the co-evolving socio-technical systems from which they emerge. Storylines about individuals are interesting, but strong storylines about companies, industries, cities and institutions can shape policy by influencing how goals are set, how problems are framed, and what kind of solutions are explored. Shifts from one storyline to another signal that the system is adaptive and evolving; as storylines become unfit for purpose, new ones emerge in their place.

This research entails an extensive review of academic, sectoral and policy literature and reports on cases of regeneration within regional industrial clusters (RIC) to identify the dominant or typical storylines about how growth, decline and regeneration within urban socio-technical systems. In so doing, the research identifies several storylines about how mutualistic, competitive and symbiotic interactions shape policy and strategy for RIC. Further, the research describes how the emergence, adaptation and disappearance of storylines over time reveal the pressures acting on the RIC and how storyline changes reflect adaptive responses, moving beyond one-dimensional criteria about growth to reveal vitality and potential. This research provides a new perspective on how to identify, manage and respond to change.
Sustainability Diffusion within Society: Blending the Quintuple Helix Model with the Pillars of RRI

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Sustainability technologies (ST) enable the achievement of the UN Sustainable Goals but require a true multistakeholder approach (Govindan et al., 2015) by bridging eco-innovators, policy makers, businesses that incorporate the technologies, and the environment and society which act as core influencers.

As a response, Carayannis, Barth & Campbell (2012) proposed and formalized the “Quintuple Helix Model (QHM)” for sustainable growth which aims at providing means for bridging the five types of stakeholders in cocreation to achieve enhanced environmental sustainability. Potential ways to leverage society in the process of ecomodernising nowadays’ communities and business operations could be tailored around the concept of responsible research and innovation (RRI) which is growing in importance in Europe. RRI argues for the need of open science, open access, gender-equality, environmental sustainability and society engagement as a key responsible growth component of nowadays’ technology transfer mechanism (EU, 2017). To this end, the QHM could build upon the RRI approach in order to achieve the mission of properly diffusing innovative environmental technologies in a true bottom-up approach (society drive), ensuring thus full societal support and co-involvement in this process.

Nevertheless, there is no evidence that such an approach is debated so far. In this context, this research bridges the QHM with RRI by relying on four case studies (focus groups) from Europe aiming to understand how to better engage society in environmental technology diffusion (as well as research & development).

The results show that quintuple helix co-creation (around RRI) positively influences ST practice adoption by properly relying on market dynamics (i.e. eco-innovation adoption, competitive pressures, societal pressures, etc). However, the actual implementation of RRI poses substantial challenges and require massive policy and regulatory framework changes across all the quintuple helix stakeholders.

Keywords: Environmental technology and society; Quintuple helix co-creation; Responsible innovation
The cross-border triple helix dynamics: an evolutionary perspective from Hong Kong and Shenzhen

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This paper builds on recent triple helix literature and related developments, set in the context of cross-border regional development. Empirically, the study draws on a qualitative and historical investigation of a specific and unique “cross-border region” in East Asia with two distinctive core urban spaces – Hong Kong and Shenzhen. The cross-border triple helix relationships between Hong Kong and Shenzhen deserve scholarly attention because of the rapidly changing and interdependent relationships developed between the two-city regions, which provide a unique case to illustrate the triple helix dynamics enabling cross-border innovation and entrepreneurship processes. The key role of the governments and policies at national, provincial and city level is noted in the evolution of technological innovation and economic development of Shenzhen and its surrounding region, which was accelerated by the “hollowing out” of Hong Kong as a manufacturing centre. A number of cross-border collaborative triple helix relationships have been institutionalized with a number of intermediary organisations and financial support from industry, governments and academic sector. Shenzhen invested in their own higher education capacity building and it has also attracted research institutes from elsewhere. Each of the Hong Kong universities established research institutes in Shenzhen with different focus and strengths. The nature of the cross-border triple helix linkages has been transformed over the last three decades as social, as well as economic and technological conditions of each of the surrounding regional economies have shifted. Based on interviews and archival investigation, we illustrate convergence as well as divergence of the strategies of universities and other institutional actors as part of the cross-border triple helix dynamics. The paper concludes by discussing how cross-border linkages are selectively institutionalized as part of the creation of the cross-border regional system of innovation and entrepreneurship.

Keywords: cross-border regional system of innovation and entrepreneurship, Hong Kong, Shenzhen.
Development models of the region with high concentration of research, development, innovation infrastructure and industry

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Keywords: grand challenges, science and technology policy, regional development, hybrid organizations.

The main and the most complex issue of the global agenda is the assessment of the impact of science on economic development. Since early 2000-s, science has seen the trend for 'managerism', according to which there must be a drive that would advance the research and market release. When assessing research, more and more attention is being paid to its impact, i.e. the way the research results influence the social and economic development of the country or a region.

Currently, science management is undergoing international transition to new principles of science organizing, i.e. from the development of priority scientific areas and technology to societal or grand challenges. A similar management approach is utilized in the 7th EU framework program Horizon 2020. The so-called grand challenges appeared in 1960-s as a method of steering science and focusing the research on the key issues of society and industry. Among the examples are the research programs on combating cancer. Since then, grand challenges vied for the leading place in the innovation model. Nowadays, for instance, in the non-linear innovation network model of 'market - technology - research - R&D - manufacture - marketing'¹, a problem that society identifies as a grand challenge may be place on the position of the 'market'.

Grand Challenges are an aggregation of problems, threats and opportunities the complexity and the scope of which is too large to be resolved, eliminated or implemented solely through increasing resources². This problem objectively requires a reaction from the government. Grand challenges, by definition, go beyond the scope of a given institutional domain. Deeming a problem a grand challenge is a consensus of three institutional domains: government, universities and industry.

The transition in the steering of science towards grand challenges re-determines the science and technology policy at national and regional levels:

– Transition from process-based approach to setting objectives;
– Stipulates long-term network coordination of many research areas and teams in cooperation with the industry;
– Stipulates not the appointment of scientific 'leaders', but the appearance of scientific teams in various research areas that can, alongside with the industry, resolve a grand challenge, as we do not know as of today which scientific of interdisciplinary domain would find the solution.

One of the formats that formalize grand challenges are national strategies and science development programs. In 2016, Russia adopted the strategy of Science and Technology Development. Science

²Strategy for Science and Technology development of Russia
and technology development in the regions and boosting the global competitiveness of their economies are considered among the main objectives. The Strategy stipulates the development and implementation of development models for at least two regions with high concentration of research, development, innovation infrastructure and industry utilizing the best national and international practice. The authors participate in the formation of one of such models based on active partnerships between universities, research institutions and technology companies.

The model is based on the following:

- Specialized educational programs that unite the participants of the Triple Helix, aimed at creating new staff positions in research and development. One of these is an international academic program for principal investigators is aimed at the selection of new research areas, achievement of results in the chosen grand challenge, resolution of problems relevant for the society or industry, technology transfer;
- Emphasis on the dynamic scientific teams that will be focused on cooperation with the industry and grand challenges;
- Re-orientation of strategies and work principles of Triple Helix participants (regional authorities, industry, universities) to grand challenges, the objectives of transition to digital economy.

The main challenges is to create hybrid organizations on the boundaries of institutions that would ensure the implementation of entrepreneurial objectives and attract investments to scientific teams aimed at resolving grand challenges; In cooperation with entrepreneurs these new institutions must generate products and services that would be relevant in the context of the fourth industrial revolution and transformation processes. The first implementation steps of this will be reported at the conference in September.
Resilient region, resilient regional higher education institution? Insights from Kuressaare, Estonia and South Ostrobotnia, Finland

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The paper investigates the organisational resilience of regional higher educational institutions (RHEIs) located in the peripheries of Estonia and Finland and focusses on two case studies: the Tallinn University of Technology (TTÜ) Centre for Blue Economy (former Kuressaare College), Estonia, and the University Consortium of Seinäjoki (UCS), Finland.

The aim is to explore the organisational resilience of RHEIs as a complex issue. RHEIs as organisations need to be resilient in two respects: they are exposed to changes in the higher education system, and they are impacted by the changes in their location region that is a part of a larger economic and administrative system. The aim is to examine especially the relationship between the organisational resilience (e.g. Burnard & Bhamra 2011) of RHEIs and the resilience of their locational regions (e.g. Martin 2012) both theoretically and empirically.

The analysis is based on the following methods and data: 1) conceptual work based on existing literature, 2) desk research of policy documents, statistics and published surveys, 3) data provided by the representatives of RHEIs, 4) semi-structured interviews and 4) action research, being directly involved in the activities of the RHEIs being explored. The presentation outlines a theoretical framework, describes two comparative cases and discusses the results.

The tentative results imply that RHEIs need to be progressive and flexible in their operations to stay resilient. They are also very strongly engaged with their locational regions and all the triple-helix parties. The resilience of those regions have effects on RHEIs and vice versa. However, the relationship is asymmetric and very complex in nature.

Keywords: triple helix, regional higher education institution, resilience
Industrial and government partnerships in international university research ventures: complementarity or substitution for local academia?

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Description:
Research universities around the world are increasingly involved in international university research ventures (IURVs) – institutional initiatives to establish overseas research centres and facilities. IURVs are usually considered a part of the global trend of internationalisation of higher education, or as a specific institutionalised form of international research collaboration. However, governments and industry in the host countries also participate as key partners in many IURVs that, in turn, pursue not only research but also an expanding mix of knowledge exchange and economic development objectives. In the present work, we aim to investigate the roles IURVs play in local academia-government-industry relationships, where they may complement or substitute domestic institutions in the attainment of policy and industry goals. We have conducted a large-scale data collection effort on IURV-related information publicly available on the websites of home universities, host partners, and IURVs themselves to identify the global distribution of industrial and government IURV partnerships and their goals, motivations and characteristics. Among 412 total IURVs identified in 86 countries, 211 have either national or regional-level government partners, while 73 are engaged in various private partnerships. 43 of those involve both industry and government partners, representing the Triple Helix-type relationships. There is a significant geographic and sectoral heterogeneity in the character of relationships with local academia among them. Some IURVs exhibit complementarity to the existing research system, such as in Singapore, where most partnerships involve local universities. Others work more as a substitute for local academia to host firms and governments, such as the case of logistics research centres of Georgia Tech and MIT in Latin America. Comparing these models will help to answer the long-standing policy question of whether support for foreign universities, potentially at the expense of local actors, helps to improve domestic capacity in science and innovation.

Keywords: university internationalization, globalization of R&D, university-industry partnership, university-government partnership, joint research venture
The effects of early entrepreneurial R&D support

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The effects of early entrepreneurial R&D support.

The paper aims at considering the long-term effects of public support for R&D investment in the start-up phase. Using accounting record for a twenty years period, we launch three different ways of understanding the effects of early support for entrepreneurial R&D funding. We compare developments on economic dimensions such as employment, turnover, solidity and patents, and fate in terms of bankruptcies, acquisitions and take-overs. The paper is primarily methodological and consist of three different, but mutually supportive models for capturing the development over time. The economic dimensions are investigated using a) synthetic control group methods and b) matching methods, whereas the fate dimensions are explored using c) a combination of matching methods and competing risk, i.e. hazard rate modelling. All three methods rely on contrafactual reasoning. That is, we use the differences between the observable, actual outcomes among the entrepreneurial companies with well supported R&D investment and the most likely outcomes among comparable companies with an absent or less substantially supported R&D investments to get a measure of effects. Based on publicly available data at the firm level and well established empirical models, the paper aims at an overview of potential effect of governmental and institutional effort at stimulating entrepreneurial efforts. Knowledge concerning the aggregated effects of early support for entrepreneurial R&D investments may have considerable policy implications.

Keywords: R&D investment, econometric modelling, matching models, competing risk.
The role of institutional frameworks in developing inter-regional innovation systems

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The systematic interaction between knowledge producer and knowledge exploitation sub-systems in regional innovation systems stresses the advantage of geographical proximity as proximate group of interconnected firms can produce competitive advantage based on the exploitation of unique resources and competencies, which have to be reproduced and developed through continuous innovation. However, this perception of spatial proximity as a competitive advantage raises the question of the possibility of creating an inter-regional innovation system (inter-RIS) with non-contiguous regions. In order to address this question, this research studies collaboration among triple helix institutions in regions that do not share contagious borders. It explores how inter-regional innovation systems are developed and establishes how the triple helix institutions in regional institutional frameworks interact with each other at inter-regional level.

This research employs longitudinal survey administered throughout a collaboration process represented by fifteen collaborating triple helix institutions from four different European regions. Furthermore, the survey findings were followed up by interviews to have deeper and more in-depth understanding of what makes an inter-regional innovation system work.

The preliminary findings indicate that the collaborative group (CG) was working from the beginning despite the fact that the perception of institutions differs. The CG continued to collaborate effectively despite their differences throughout their collaborative process. Even though literature suggests that geographical proximity is advantageous as it reduces coordination costs and transfer of tacit knowledge is possible, the findings to date suggest that inter-regional triple helix institutions involved in the CG established an interaction and collaboration that works effectively over a distance.

The major contributions of this research are the uniqueness of the method employed especially the longitudinal aspect of the study, the generation of a deeper awareness of ‘proximity’ with regard to developing inter-RIS and its new insights to existing research on triple helix institutions’ interactions, particularly at inter-regional level.

Keywords: Proximity, inter-regional innovation system, inter-regional institutional engagement, collaborative stakeholder engagement, Triple Helix
Synergy in the Knowledge Base of U.S. Innovation Systems at National, State, and Regional Levels: High-Tech Manufacturing and Knowledge-Intensive Services

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Using information theory, we measure innovation systemness as synergy among size-classes, zip-codes, and technological classes (NACE-codes) for 8.5 million American firms. The synergy at the national level is decomposed at the level of states and Core-Based Statistical Areas (CBSA) as regions. Thereafter, we zoom in to the state of California and in even more detail to Silicon Valley. Our results do not support the assumption of a national system of innovations in the U.S.A. Innovation systems appear to operate at the level of the states; the CBSA regions are too small, so that systemness spills across their borders. Decomposition of the sample in terms of high-tech manufacturing (HTM), medium-high-tech manufacturing (MHTM), knowledge-intensive services (KIS), and high-tech services (HTKIS) does not change this pattern, but refines it. The East Coast—New Jersey, Boston, and New York—and California are the major players, with Texas a third one in the case of HTKIS. At the regional level, Chicago and industrial centers in the Midwest also contribute synergy. Within California, Los Angeles and its environment contribute synergy in the sectors of manufacturing, the San Francisco area in KIS, and Silicon Valley in both, but with synergy mainly generated by manufacturing. Knowledge-intensive services in Silicon Valley spillover to other regions and also globally.
University-Industry-Government Relations in a Fast Developing Economy: Co-existence and Dynamism

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Keywords: University-Industry-Government Relation, Innovation System, Triple Helix, China

Abstract:

Along with the fast growth of economic development, China’s innovation system is now experiencing considerable transitions from a traditionally central-planning system to a more dynamic and open system, which involves intensive interaction, bilateral and trilateral relationships among governments, universities and industrial players. This research explores the current condition of university-industry-government relations in China and contributes to extant literature by providing evidence in a fast developing economy.

Guided by the “Triple Helix” literature, this research presents an in-depth case study on collaborative innovation practices led by firms, universities and governments. Through the lens of Chinese manufacturing Small and Medium-sized Enterprises from both conventional and emerging industries, this research investigates the co-existence of university-industry-industry relations in terms of “statist”, “Laissez-faire” and “Balanced” configurations, and further explores the dynamic characteristics of the above relationships leading to more interactive innovation systems.

Semi-structured interviews are conducted with 34 SMEs managers, which are randomly approached in four manufacturing sectors, including intelligent hardware, medical device, equipment and auto-parts industries. Another 11 interviews were done with industrial experts and government officers. The research finding demonstrates that universities are playing significant roles in facilitating innovation development in firms and contributing to regional innovation development through various functions. In particular, in conventional industries with established technologies, the university-industry-government relation is a “Laissez-faire” configuration. In emerging industries with highly dynamic and frontier technologies, the university-industry-government relation is a “Balanced” configuration, where the three parties jointly lead and influence innovation development. In transitional industries, government plays significant roles in leading the transition, which forms a “Statist” configuration. Finally, the research discusses the dynamism of university-industry-government relationships from bilateral to trilateral networks and the implications for China’s innovation system development.
Exploring dynamic actors’ roles by combining the Triple Helix model and innovation ecosystem

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The Triple Helix model has been adopted widely to analyse the roles of universities, government, and business in an innovation system. However, existing studies using this method mostly have a static view of the innovation system but ignore the dynamic roles of the actors. This study aims to fill in this gap. Drawing upon the Triple Helix model and the innovation ecosystem concept which emphasizes the dynamic characteristic of a system, we have engaged in an in-depth case study in China to reveal how the actors’ roles evolve within an innovation ecosystem. We find that in the birth stage, firms act as an ecosystem leader. They define the value proposition and build the platform to attract the participation of other actors, while universities assist in generating knowledge and inputting human resources into the ecosystem. In the expansion stage, in the initial period the government mainly focuses on improving the macro environment through a mix of economic and financial policy instruments. Afterwards the government collaborates with firms and universities to jointly facilitate the dissemination of knowledge and the diffusion of technology. They coordinate to promote innovation by forming complex networks. In the mature stage, the government takes measures to ensure fair market competition, while firms and universities play key roles in dealing with emerging challenges in policy and technology so as to maintain the sustainability of the ecosystem. In conclusion, this research demonstrates the overlays among the three helices. It moves further to disclose the pattern of the dynamic roles of universities, government, and industry in a system. Practical implications for these actors to play the roles in innovation are given. Future research directions of using our method to explore the dynamic roles of different actors in varied contexts of countries and technologies are delineated.

Keywords: Triple Helix, innovation ecosystem, dynamic, China, case study
The number of science and technology parks (STPs) is ever increasing in the world, often with the aim to enhance local/regional innovation and growth. Low- and medium-innovative countries in Asia are increasingly adopting models of STPs, among them Indonesia. Since the early application of STPs, physical proximity of triple helix - firms, university and government - are seen as a key supporting factor in the park’s growth. However, physical proximity is not enough to encourage collaboration among triple helix and beyond, reason why attention has shifted from physical proximity to the role of social capital. Social capital works as a “glue” to bind triple helix actors and prevent impacts from inequality (imbalance) of power position. Moreover, previous studies have –so far we know– seldom considered and assessed influence from power balance and STP growth. Given these knowledge gaps, this paper aims to increase understanding of influence of power balance in visions/models on STPs used in practice, in particular of their actual growth regarding firms and contribution to the regional economy.

We use original data of 40 STPs in Asia that reflect diversity in management, firm segments, business sectors, technology level, knowledge sources, and R&D activities on the park. Our preliminary results show clearly different ‘amounts and types’ of perceived social capital (such as trust, positive-valued relationships, and shared visions) as well as variation in power balance leading to different growth patterns of STPs. In next step, three case studies of power imbalance are analysed to explore how social capital can be built and improved, and how processes of boundary-spanning can be “guided” to overcome the imbalances among triple helix actors.

Keywords: Science and Technology Parks, Triple Helix, Social Capital, Power Balance, Asia
Dynamic interactions between university-industry: evidence from Brazil and Spain

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This paper discusses the role of the university-industry collaboration for university patents and examines the experience of Brazil and Spain to better understand the different types of university-industry collaboration, motivations to form these agreements and barriers to cooperation, as well as the role of public policy in fostering such linkages. Our analysis covers all university patent applications of Brazilian and Spain origin deposited in the Patent Cooperation Treaty (PCT) in the period 2001-2015, totalling more than 2,600 patent documents. Our results show that collaboration is less marked in Spain, where only 4% of patents are available in collaboration with companies, whereas for Brazil it is 11%. Our discussion reinforces that the difficulty lies in the ability of companies to absorb knowledge in both countries. However, we show that the latest innovation policies have encouraged hype in the university patenting, and sometimes, it has stimulated embryonic inventions and also with low interest on the part of companies.
Non-technological application of the triple helix model

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Purpose: Triple helix research has traditionally focused on technological knowledge transfer. However, this approach excludes a large range of sciences that are not technology-oriented, including many environmental sciences. These sciences contribute significantly to socio-economic and environmentally sustainable development and thus require closer examination in the context of academia-industry-government relations.

Further, in discussions about knowledge transfer, communication aspects of triple helix relations cannot be ignored. Put simply, communication is at the heart of every knowledge transfer. However, existing studies relating to communication among and within the triple helix spheres have not yet been consolidated into a single coherent whole. This is required to identify current knowledge and gaps for future triple helix research.

Design: This presentation will initially focus on results of a systematic literature review on the topic of communication. The results include findings from qualitative and quantitative analysis, i.e. trends and gaps.

The presenter will then outline future research that aims to fill in some of the current knowledge gaps. This includes an on-ground exploration of communication pathways and patterns that carry knowledge within the tourism industry.

Originality: The researcher will present a review of current knowledge about communication studies within triple helix research.

Further, this presentation will showcase a pilot application of the triple helix model to non-technologically oriented domains, linking environmental science and the tourism industry in Queensland, Australia through communication-centered research.

Significance: Presenting results from the systematic literature review will assist the triple helix community in identifying original areas of future research.

Presenting the novel triple helix application will foster debate among the triple helix community about the unexplored potential of triple helix research.

Keywords: non-technological innovation, communication review, environmental science, tourism industry, triple helix
Which is the role of universities in regional transformative change? The case of Colombia

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Universities’ third mission role is often restricted to knowledge transfer activities with companies. However, new generations of innovation policies (Schot & Steinmuller, 2016; Mazzucato, 2018) seeking to address grand challenges and transformative change plead for a new third mission, invoking universities as harbingers of system transformations. The novelty of these policies, particularly at the regional level, opens new room for conceptualising the regional implications of these policies and the role that universities can play in it. The paper conceptualises a new third mission within this new wave of innovation policies and especially develops a new ‘third mission configuration’ for universities in such a framework. For doing so, the authors rely on the novel literature of transformative innovation policies in a broad sense and in the specific case of Colombia. Colombia is an interesting case to study as it has promoted transformative regional innovation policies in the last years with the support of European partners. As a consequence, Colombian regions, and more precisely their universities have embedded with policy-makers in processes for transformative change. This has been only possible thanks to the commitment to academics to regional challenges, even forcing in some cases networks of academics and policy-makers to deal with this. The paper will be built around several Colombian cases to illustrate this new third mission role.

Keywords: High Education Institutions, Regional Policy; Transformative change
First, second and third tier universities: academic excellence, local knowledge spillovers and innovation in Europe

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This paper aims to study whether research at first tier universities has greater local knowledge spillovers than that at lower tier universities. The source of information on company innovation is the EU-EFIGE/Bruegel-UniCredit dataset which provides data on manufacturing firms in seven European countries. Information on universities is gathered from many sources and is collected at the NUTS3 level. Indicators of academic excellence are the number of SCOPUS publications and the Academic Ranking of World Universities: the number of publications of all the universities in the province where the firm is located is initially included among the contextual drivers of innovation in a multivariate probit regression applied to firm data. Then, the number of SCOPUS publications is split and assigned according to the ranking of universities, to first, second, third-tier universities. The econometric model consists of five simultaneous equations related to the following dependent variables: \textit{intra muros} R&D investment; R&D collaboration with universities and/or research labs; R&D collaboration with other firms; process innovation; product innovation. The results show that the total number of SCOPUS publications has a direct impact on firm innovation. When disentangling the contribution of star universities from less prestigious institutions, the empirical evidence shows that research at second tier universities impacts product innovation more than that at first tier universities; furthermore, research at first tier universities exerts a negative impact on process innovation whereas the research output of third and lower tier universities is beneficial. The SCOPUS publications at first tier universities influences product innovation only of supplier-dominated industries whereas they have a detrimental effect on process innovation for the scale-intensive, specialised-supplier and science-based macro-sectors. Furthermore, academic research of both first and less prestigious universities positively affect the university-firm collaboration of science-based firms. Our results suggest that academic excellence does not automatically imply production of local knowledge spillovers.

Keywords: Product and process innovation; Firm R&D collaboration; Academic excellence; Scopus publications; Academic Ranking of World Universities
Industrial firms in developing countries often face high levels of resource scarcity in terms of capabilities, finance, and physical infrastructure. Hence, we explore how firms with limited policy level support might benefit from collaborative engagement with universities, utilising firm level insights from Sri Lanka and Pakistan. There is limited recent literature that examines the trajectory of university-industry (U-I) engagement across South Asian countries. Knowledge interaction between firms and universities can take a variety of forms, which should be viewed more broadly than a bilateral collaborative agreement. Relationships between universities and firms in the two countries analysed here have developed very slowly over recent years, mainly due to divergent viewpoints concerning the merits of such engagements. Industry demands research in practical fields (e.g. IT, telecommunications, agricultural sciences, chemicals, textiles, etc.) whereas universities prefer to focus research in their own respective scientific areas.

Our findings from company interviews and two major workshop events (held in Sri Lanka and Pakistan) provides evidence of how universities and firms can work together on innovation projects by overcoming certain types of challenges, which might help improve business level competitiveness. Here individual actors and personalised capabilities can be crucially important in meaningful U-I engagement because general institutional trust does not exist among science and industry in the two countries analysed. Hence outstanding individuals (e.g. U-I collaboration champion), like business managers or senior engineers can play a prominent role to help provide the necessary institutional resources and capabilities to demonstrate mutual benefits from U-I collaborations.

Industry feels that there needs to be some mechanisms in place that help improve the understanding of what firms and universities can offer to each other. One important issue arising from the workshop forums is the need to create a national institute that acts as an U-I coordination body, which can highlight the benefits of U-I engagement to both universities and industry, as well as organising forums that bring together key actors at conference and other events to gain a better understanding of the needs of potential collaborators. Some industry people would also like to see Government play a more proactive role in helping to set-up such a national coordination body, which does not currently exist in Sri Lanka and Pakistan.

Keywords: U-I engagement; developing countries; business managers; national institute.
Evolution of Singapore’s Innovation System: Moving towards Hybrid Triple Helix Model and Open Innovation

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Key Words: Singapore, Hybrid Triple Helix Model, Open Innovation, Small and Medium Enterprises

Singapore’s government is known for its extraordinary role in the economic development of the country. Keeping in view the importance of innovation and technology for sustaining the trajectory of the island economy, the government, since 1990’s, has been periodically taking steps to boost innovation and entrepreneurship in the city-state. The results have been satisfactory as Singapore features high in various international innovation rankings.

Over the years, Singapore has primarily been following the statist model of Triple Helix wherein the government intervention has remained very high and the relationship between the universities and businesses has been planned, controlled and directed. However, some recent literature shows that the government has started realizing the importance of hybrid model of Triple Helix and Open Innovation. Agencies like SPRING Singapore and Intellectual Property Intermediary have been established as boundary spanners for inflows and outflows of knowledge among various actors in the innovation ecosystem. In 2016, Intellectual Property Intermediary, International Enterprise Singapore and Singapore Manufacturing Federation formed a consortium and established Enterprise Europe Network. This is regarded as one of the world’s biggest innovation and business networks. It is also positioned to connect Singaporean Small and Medium Enterprises (SMEs) to European SMEs for research collaboration and technology transfer.

This presentation will trace, through published sources and institutional websites, the evolution of Singaporean innovation model and how there is some movement towards hybrid Triple Helix model. It will explore the factors that have motivated the government to create boundary spanners like Intellectual Property Intermediary and encourage Open Innovation especially for the hitherto neglected local SME sector of the country. It will further show how the redefined innovation and technology policy is aiming to sustain the economic trajectory of the country by promoting Open Innovation for correcting the aberration of concentration of resources in small number of players.
Innovation and technological development: the Brazilian army in the triple helix model

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Abstract: Innovation has as one of its main characteristics to modify, for the better, the quality of life of society. In the defense sector, in addition to national security, it brings other benefits to society in various technological areas, through the development of technologies and products that go beyond military use and are incorporated into the daily lives of the population, as the internet and touch screen, examples of technologies that have arisen from research for defense sector demands. One of the models for the search for innovation is the Triple Helix, a term that was presented by Henry Etzkowitz in the 1990s and it was born from the observation of the Massachusetts Institute of Technology's (MIT) relationship with high-tech industries in its surroundings. This model is based on the synergistic performance of academy, government and industry, in order to achieve technological development. The Brazilian Army has been realizing actions with the objective of acting according to the triple helix model, in order to seek the technological development of the country through the strengthening of the Defense Industrial Base (BID). Among these actions, implemented the Defense, Industry and Academy System (SisDIA) of Innovation, which in its own nomenclature already demonstrates the pertinence with the model under study. This work presents, through a bibliographical and documentary study, the performances of the Brazilian Army in the three "blades" of this helix, as government, when it orders or finances technological projects, through its academy, the Military Institute of Engineering, which graduates engineers in various specialties, or as industry, through the War Material Industry (IMBEL), which is a public company linked to the Ministry of Defense of Brazil, through the Brazilian Army. Finally, it was verified how this institutional performance can contribute to innovation at the national level.

Keywords: innovation; triple helix; defense sector; Brazilian Army
Re-planning Larissa based on the Triple Helix model: Using heritage to shape its urban future

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The triple helix model has been widely used as a source for implementing policies and programmes focused on fostering innovation. Collaboration and integration are central and a main method of driving growth, regeneration and, more generally, development of a locally driven, knowledge based economy. Success is also based on close relationships and trust that are greatly facilitated by proximity. Thus, geography matters and cities are perhaps the most organized and well-structured forms of space. However, cities are also perceived as bureaucratic and rigid organisations. A triple helix asks for a more entrepreneurial orientation of all the urban players involved. In that context what could be the relevance for cities? How can they grow their economies using triple helix approaches?

The paper aims at describing how Larissa, a medium city with a population of 162,000 situated in the center of Greece and a main administrative, agricultural, commercial and educational cluster, can use heritage to shape its future implementing the main principles of the triple helix philosophy and model. The paper argues that Larissa has a strong agricultural heritage and it is that heritage that attributes to the city a strong sense of place and pride as well as a sense of importance that can facilitate further growth and development and transform the city into a new area. Larissa lacks an historic town centre. It lost the main part of them during the 2nd World War and after a number of severe earthquakes. However, the city remains a vibrant place with a high concentration of university students and a heavily distributed set of villages across the broader area. Therefore, Larissa builds on its heritage of an agricultural city and uses this to develop a new identity and a new economy, in fact a more circular, sustainable and a triple helix urban economy.

Keywords: Greece, Heritage, Triple helix model, Urban Planning
Graduate start-ups and their regional context: opportunity versus necessity?

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Recent studies suggest that more consideration should be given to the growing scale and economic relevance of graduates’ start-ups, based on the recognition of undue policy and research interest placed on university spin-offs, commercialisation of research and IP protection, as well as the magnitude of the graduate start-up activities across a number of countries. This paper examines the organizational and regional contexts that influence graduate start-up activities in the UK. Broadly, we aim to better understand how territorial and institutional differences in terms of opportunities exert an influence on graduates’ entrepreneurial choices. Graduate start-ups do not happen in a vacuum but rather are embedded in the institutional contexts generated by higher education institutions (HEIs) on one level, and their wider spatial economy on the other. HEIs are enabling environments which help graduates to generate start-ups and nurture their growth, but are also nested in a regional system that shape graduates’ opportunities. Particularly, regional level characteristics can become ‘push factors’ of entrepreneurial choice, e.g.: can push graduate start-ups activities as a substitute for the lack of attractiveness of other employment opportunities. Our underlying hypothesis is that different regional contexts influence the shape of entrepreneurial opportunities for graduates via the availability and accessibility of economic resources, or the attractiveness of the employment options. In turn, also universities can enhance regional growth by producing human and knowledge capital stock through the availability of skilled labour and by providing innovative knowledge.

This work focuses on England in the UK and looks at these differences across its nine regions (NUTS1 level). It develops an original database collecting longitudinal data between the academic years 2008/2009 and 2015/2016. At the university level we look at specific characteristics defining the HEIs entrepreneurial system, including organisational structures to foster graduate entrepreneurship (e.g. entrepreneurship courses, incubators, accelerators, areas of subject specialisation), as well as university level indicators to signal the capacity to enable graduate ventures (e.g. grants and business competitions; HEIs seed funding). At the regional level, we look at competitiveness indicators (entrepreneurial support networks, business angels, informal institutions and innovation and creativity in the region defined by number of workers in creative businesses) and the capacity of the local economy to offer an attractive market for graduates while controlling for the degree of regional retention of graduates after their studies, long term unemployment levels; regional distribution of higher education institutions; and start-up rates at the regional level.
The role of charitable funding in university research

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There has been a diversification in the sources and rationales of university research funding in recent decades. Several studies have discussed this change, but to our knowledge there have been no studies on the role of charitable funding in university research. Given the importance of the charity sector in funding research, this is highly relevant topic for the International Triple Helix conference.

The aim of this paper is to explore the significance and impact that non-governmental non-profit organisations have on academic research through their sponsorship of doctoral students. The PhD acts as a gatekeeper to academic research and shapes the dynamics of the future academic workforce, and therefore it will be useful to explore the association of funding organisations with topics pursued by doctoral candidates.

Methods
Using curated metadata harvested from the British Library’s EThOS database of theses produced in UK institutions between 2011 and 2017, we demonstrate an accurate and comprehensive search strategy to classify research funders into government, business and charity sector. Statistical and lexical analyses were conducted with 6371 records to investigate the differences in types of theses funded by different sources. In parallel, we looked at the websites of organisations with high frequency in the dataset to better understand how the theses they fund relate to their own regulations, governance approaches and funding sources.

Results and Implications
The sponsor classification strategy developed in our research classifies theses by sponsor type with high accuracy. Charitable sources are significant players in medical research, which is in line with the abundance of medical research charities operating within the UK. However, when medical research charities are excluded from the dataset, a disproportionate focus on funding humanities and social sciences research is found. From further analysis of funder policies and funding sources, we hypothesise a link between the funding source of charities (endowment or donation) and the choice of subjects sponsored.

Keywords: research funding; charity sector; doctoral research; big data; lexical analysis
Pathways of regional specialization in the Spanish wind energy sector

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This study provides analytical evidence on the key governance mechanism of the development of wind energy sector in Spanish regions over the period 1995-2012. It will focus on the extent to which research organizations, government and industry have engaged in a variety of regional pathways of industry emergence and reconversion. It will be shown that pathways of regional specialisation stem from the coordination of a wide mix of policy instruments and governance mechanisms.

To this end, we elaborate a qualitative comparison of patterns of relations between different actors and related performance to identify how different regional contexts respond to a favourable institutional framework to spur the emergence of new industries. The heuristic comparison proposed here focuses on two mechanisms, namely: the recombination of existing regional knowledge inherited from past industry and the creation of new knowledge. Such an exercise illustrates aspects of agency, related variety and specialization on the diversity of routes that have been used to promote specialization within the sector value chain.

Spain is a relevant case in point considering that in a relatively short span it has become a world leader both in terms of both energy and specialized technology production. We argue that this trajectory would not look so triumphal had it not been for the pivotal role of regional actors such as utilities, technology manufactures, research centres and local government in facilitating the creation and mobilization of specific know-how. Accordingly, we identify the multilevel interactions between public and private sectors that unleashed the latent potential of this emerging sector. More than this, we contrast the cases of four archetypal regions (Castilla y Leon, Galicia; Navarra and Basque country) to disentangle commonalities and specificities of the governance mechanism that enable regions to achieve significant market deployment and sectoral specialization through different regional learning processes.

Keywords: pathways, knowledge, regions, industrial specialization, wind energy
A logic model framework to evaluate Technology Parks as Policy for Local and Global Development

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The contribution of this paper consists in designing a logic model framework to evaluate Science and Technology Parks (STPs) as policy for local and global development. The relevance of such approach stems from the argument that these environments deserve a prominent place in the governmental agenda, as they are claimed to be essential for development and international competitiveness. Developing countries have recently perceived them as tolls for their economic catching up process and for upgrading their connections in the increasingly complex global economy. However, it is not clear what that regional development means, why STPs is a reasonable option to achieve it and how are them affecting the global economy. These uncertainties derive not only from the vagueness of the correspondent policies objectives but also from the lack of academic studies investigating STP public policy features. Few efforts recently arose only to assess the private returns STPs can provide to their stakeholders. These, however, ignore positive externalities society should benefit for financially supporting them. Aiming at filling these gaps and at building means for future evaluation of STPs incentives and results, a systematic literature review of case studies developed by selected authors was carried out. Coding and content analysis procedures were then performed using Atlas Ti software, which allowed a constructive theoretical dialogue and enabled the final construction of a STP logic model for its evaluation. We concluded that, in addition to the global dimension, STPs would promote at least six types of local development to which problems, inputs, action and results were linked: innovative; economic; entrepreneurial culture; academic; urban; and social. This paper is meant to be a design and action contribution intending to inaugurate a research agenda to be applied in different regions that expect STPs to be strategic policies for local and global development.
The Effect of Holding a Research Chair on Scientists’ Research Impact

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Keywords: Citation, Research Chair, Research Impact, Science Policy

Abstract (296 words): This paper examines the effect of holding Canada Research Chair (CRC) on a scientist’s number of citations as a measure of research impact, based on an econometric analysis with combined data on Quebec scientists’ funding and journal publication. We built a data set based on the integration of data on funding and journal publications for Quebec scientists. For publications, Thompson Reuters Web of Science provides information on scientific articles (date of publication, journal name, authors and their affiliations). We build variables for the yearly number of articles published by an individual researcher in any given year, the number of co-authors, and the number citations. In terms of funding, we use a database of Quebec university researchers. This database lists the grants and contracts information, including yearly amount, source, and type for the period of 2000-2012.

Using Generalized Least Square (GLS) method for regression analysis, the preliminary results show that the effect of holding a research chair on the number of citations depends on the type of chair: Canada research chair has a significant positive effect on the number of citations but other types of chairs do not have a significant effect. This finding highlights the special attributes of the Canada research chair program, which are not replicated in other types of chairs. Those specific attributes may significantly push scientific productivity and research impact. Among others, Canada research chairs are generally associated with some degree of prestige or higher visibility to recruit talented students or to have research collaboration with top scientists in the field. The fact that other types of research chairs do not have an impact on scientific community, implies not that these chair holders are lesser scientists, but that they are devoting part of their time to other endeavours of a more practical nature.
Engineering education and research has a particular role in an ecosystem of innovation. It crosses several systems, by cooperating with all kinds of actors; local, national, international but also cooperating with local and professional sector, civil associations, trainees’ initiatives, local authorities.

We study the influence of the environment focused on innovation as presented by 3 Engineering school (or universities) on the engineer training concept. We try to extract the influence of the evolution of the local ecosystem based on the model of the “triple helix” (related to the relation between government, company and academia and later expended version), on the evolution of the engineers’ training concept.

We check the links between entities, the interstitial organisations created to generate a particular dynamic to enhance innovation and competitiveness of the territory argued by the academics. We also made a particular focus on the origin of the engineer training in each case chosen to illustrate different paradigm rooted in the specific period and French context. As a result it seems to reveal that different paradigms were at the origin of the trainings’ design and characterized the differentiation of the engineer schools until now. It could be, at the beginning, co-constructed with the local actors from different institutions, but the training concept was marginally transformed and keeps the principles that were introduced at the creation of the training. The trainees invest a specific links through peripheral associations or events; but it is not at the hearth of their education stakes and it is not taken into account of their global evaluation. What about influence of the innovation system and local ecosystem on the education system in the engineer specialities? If these trainings have a capacity of a long term transformation to be resilient, can they play a role for a new generation of engineers?
Universities play a key role in national and regional innovation ecosystems and governments incentivize them to contribute to economic development. Universities fulfil this role by engaging in knowledge transfer. Studies on how and why university knowledge transfer networks evolve over time, i.e. network dynamics, increasingly receive attention. Network dynamics of university knowledge transfer in China especially deserve attention. China transforms itself to an innovation-based country and universities play a key role in this transformation. At the same time, China suffers from uneven economic development across regions and limited inter-regional knowledge transfer. A few studies integrate network dynamics and university knowledge transfer dynamics in China, but leave the universities’ key role in knowledge transfer on the background. Since joint-applied patents are indicators of knowledge transfer, we use patent data of 42 “Double First-Class” Chinese universities from 2004 till 2014 to study (1) how the position of Chinese universities in knowledge transfer networks evolves over time and (2) how Chinese universities contribute to inter-regional knowledge transfer. We draw upon inter-organizational network theory and construct a multi-centred closeness index to uncover a centralization trend of Chinese universities in their knowledge transfer network. We group universities by 24 regions and calculate the minimum steps required for universities to reach other regions. We find that inter-regional university knowledge transfer increases steadily over time and that the percentage of isolated regions within the university knowledge transfer network drops from around 90% in 2005 to less than 5% in 2014. We show that Chinese universities are key bridges to foster inter-regional knowledge transfer. This paper extends the knowledge on the universities’ role in China’s national and regional innovation ecosystem and implies that policy makers and researchers should pay attention to inter-regional university knowledge transfer as a way to overcome uneven economic development and innovation activities across regions.

Keywords: knowledge transfer, universities, China, networks, inter-regional
The economies aiming to develop a solid scientific labor force find in international mobility a way to enrich the creation of research capacities by sending nationals to study abroad. In some countries the interest in sending citizens to learn from the best meets with the risk of losing them to other economies. Mexico is one of the countries where the formation of doctorates is a priority, and international mobility is a mechanism by which the government fosters doctoral training. Mexico also faces emigration of the most talented. This study explores how the programme for doctoral formation corresponds, or not, to the needs of the employers for doctorate holders. This study looks into the involvement of the different actors, and how these actors perceive the value of international mobility in doctoral training and the effects of the interaction between actors in the absorption of doctorates and creation of research capabilities. This research focuses on the programme by which Mexico funds its citizens to pursue doctoral education abroad. The scope of the research focuses on the actors in the nano sector. This work adopted a qualitative approach. Interviews were conducted with policymakers, universities, and companies, and a qualitative online survey was used to capture the perceptions of citizens that pursued doctoral education in foreign universities. Findings suggest that when actors do not see their interests reflected in policies, their involvement is limited, affecting the possibilities for capitalisation of doctorates, which promotes long-term emigration or the under-capitalisation of the human capital built abroad. The implications of these findings are that S&T policy might reconsider the focus on international mobility and that governments must promote the participation of actors in the policy process in order to develop strategies where they share a common interest.

Keywords: doctorates, international mobility, policy, involvement of actors, research capacities
Universities in the complex setting of the West Bank: entrepreneurial or engaged?

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Abstract
Palestinian universities lack resources, have restrictive (inter)national mobility opportunities, and are faced with numerous security measures. This paper analyses to which extent entrepreneurial transformation at these universities is taking place and how it is related with the political, economic and cultural complex setting in which they operate. It combines a literature review with findings of a mixed methods study at four universities applying the entrepreneurial university framework of the European Commission/OECD. A total of 125 people were interviewed and 256 respondents filled out a structured questionnaire with statements on their own institution. Findings indicate that staff and students are more negative than positive about the entrepreneurial status of their respective institutions, with students being more critical than staff. At each of the universities, international donor supported entrepreneurial activities are starting up as a way to overcome youth unemployment. The author concludes that entrepreneurship education is brought in as a new instrument in the political, cultural and economic struggle of the Palestinians. Being rooted and intertwined with the Palestinian cause, the universities are ‘anchor institutions’ that contribute socially and culturally to their local and regional communities. They can be better understood as being engaged than entrepreneurial. The results have relevance for the debate on what entrepreneurial universities are vis-à-vis universities that perform entrepreneurial activities.

Keywords: entrepreneurial university; Palestinian Territories; entrepreneurship education; higher education; employment; engaged university
An impact evaluation of the Tech city cluster programme

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This paper evaluates the Tech City cluster programme, launched by the British Government in Inner East London in 2010. This flagship programme aimed to grow the area’s vibrant tech scene through place branding, marketing and business support, and has since expanded to cover the whole UK. The policy has been claimed as a great success, but critics argue that it has primarily contributed to higher rents and displacement. As such, this paper is highly relevant to the THC governance and policy theme.

In principle, the policy could lead to one or more of cluster growth (if agglomeration economies dominate), cluster crowding (if competition effects dominate) or cluster breakup (if property market effects dominate). I combine administrative microdata and commercial rents data to explore. I first look at key trends in the area 1997-2017 at LSOA level. Next, exploiting the policy’s quasi-random origins, I use matching plus 1) difference-in-differences and 2) a synthetic control to causally identify policy effects on cluster size, density and tech plant performance. I then deploy a treatment intensity approach to look at within-cluster shifts. My data allows me to compare officially-defined tech industries and alternative, ML-based definitions of industry space. I find that the policy helped grow and densify hardware and software activity, but has weaker, more mixed impacts for the larger, incumbent group of digital content plants. This is consistent with growth for the former, and competition/crowding for the latter. I also find some evidence of cluster breakup, with activity moving from the cluster core to the periphery. Consistent with this, descriptive evidence shows that compared to the immediate pre-policy period, the cluster area exhibits consistently rising commercial rents, slower rates of plant creation, and higher rates of out-moves to the rest of London and the rest of the country.

Keywords: Clusters, local economic development, Tech City, difference-in-differences, synthetic control analysis
Linking firm characteristics, science park attributes and perceived benefits: empirical approach and results

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Science parks often operate within hybrid space of the Triple Helix model and aim to enhance networking, innovation and economic performance of firms and regions. What the preferred configuration of these science parks is in terms of the attribute package it should offer to meet demands of resident organisations remains unclear. This study seeks to reveal the benefits that science park firms associate with specific science park attributes. A better understanding of relevant attributes and relationships with benefits that these firms seek can contribute to adapting science parks to the needs of users. This research follows the means-end theory, which suggests that products are acquired based on the benefits that individuals link to certain attributes, and uses a large sample of science park firms and statistical analysis to reveal the demands.

Science park attributes and benefits are first retrieved from literature research of prior empirical studies on science park firms. Data are collected through an online questionnaire. Science park attributes that the firm values are first elicited in open response format. The text strings obtained from this elicitation process are subsequently matched by the respondent with a list of pre-defined attributes. Next, the respondent is asked to indicate for each mentioned attribute the reason(s) why the attribute is important through a selection from a set of pre-defined benefits. The questionnaire is distributed among firms located on eight science parks in the Netherlands. This study reveals the associations science park firms make between attributes and benefits they perceive. Furthermore, the influence of firm characteristics on these perceptions are analysed. The results of the analysis provides academics, practitioners and policy-makers with valuable insight on the attribute-benefit associations (high technology) firms make that should allow them to make better informed decisions on science park management and development.

Keywords: science parks, perceived benefits, means-end
Implementing the quadruple helix of innovation: Exploring challenges

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Based on the concern that mechanisms and processes to implement quadruple helix collaborations (government, academia, industry and users/citizens) have not been well-established, the purpose of this paper is to empirically explore the implementation of quadruple helix for innovation through understanding its benefits and challenges. With a qualitative research design, this paper presents a multiple case studies of collaborative organisations that orchestrate the participations of a quadruple helix approach in the network of Catalan open labs (e.g. living labs, fab labs). Secondary sources of information and mostly semi-structured interviews with leaders, users and available helices of the chosen organisations will be the basis for the analysis. While citizens and government are present actively in all studied organisations, universities and companies are present only in some occasions, but their participation is not consistent. The reflection from the data analysis is that it is necessary for such organisations to be organised under the quadruple helix collaborations in order to broaden their impacts and to ensure their sustainability. On the other hand, the main challenges identified through the cases are 1) More specific projects need to be recognised to enable the involvement of quadruple helix stakeholders, including active citizens, 2) The commitment from government is dependent on political cycles, 3) Finding a sustainable funding is challenging, 4) The innovation outcomes are difficult to measure since it is delivered under form of tacit knowledge. Although there are new products developed, they are still in a small scale and individually-customised. The main contribution of the paper is identifying the benefits and challenges in implementing a quadruple helix model, especially from a micro-level of the collaborative organisations/projects involved or resulting of collaboration. We discuss how these findings are learnings to be used for future collaborations and to inform further evidence-based policy.

Keywords: quadruple helix, innovation, challenge
The ‘black hole’ of evolutionary regional innovation ecosystems: The role of effectual entrepreneurial discovery processes

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The encouragement of collaboration between regional stakeholders is increasingly emphasised in innovation policy as a way to activate the inherent agency in a regional innovation system. Partnerships of diverse stakeholders have been identified as critical, being able to envisage and implement future pathways that in turn bring change to a region. Thus, knowledge concerning the regional assets and possible future pathways is supposed to be discovered through cooperation between diverse stakeholders. Nevertheless, it has been recognised that these agency activation approaches often fail to deliver consequential transformations, agreed by partners in terms of a long-term vision. Sotarauta argues that partners may find themselves falling into a ‘black hole’ when subsequent policy cycles repeat earlier successes rather than consolidating those successes into more systemic change. Accordingly, understanding the conditions under which regional stakeholders can, through a process of constructive dialogue, build realistic and adaptable strategies that can shift regional development trajectories still remains a substantial challenge in innovative regional development theories. In this paper, we argue there is an issue arising from the way these agency activation strategies are supposed to develop long-term plans, as partners’ mind-sets may be too causal and lack the flexibility to reorient strategies in their implementation phases.

Focusing specifically on one of these agency activation approaches, namely smart specialisation, we reflect on whether there are also the possibilities for more effectual (opportunistic/flexible) approaches to entrepreneurial discovery. We use a qualitative case study approach comparing entrepreneurial discovery processes in three less successful regions, namely Twente (Netherlands), Aveiro (Portugal), and Lincolnshire (UK), drawing on interviews with key stakeholders as well as analysis of process reports and policy documents.

Keywords: entrepreneurial discovery, agency activation, collaboration, partnerships, causal and effectual approaches
Innovation in collaborative projects across European countries: A conceptual framework understanding Critical Success Factors

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A systematic review of the literature suggests that distributed innovation processes are considered an option to handle the growing complexity of new products and services. Although collaborative research and innovation is therefore key for economic success and social development, a better understanding of the critical factors that lead to success in collaborative projects could lead, on the one hand, to rationalising resources (from the practitioners’ perspective) and, on the other hand, to develop more effective innovation policies, by understanding critical aspects of the innovation process, such as innovation activities, interactions amongst actors, and relevant knowledge flows.

The purpose of this paper is to explore and conceptualise a novel framework from the identification and analysis of the Critical Success Factors in international collaborative projects that produce innovations, taking into account both quantitative and qualitative aspects. This methodology would allow to stablish links between different fields and frameworks in the literature, such as the role of innovation policies to understand how programmes can foster those success factors to maximise their impact.

The conclusions of the paper will deepen in the structure of collaborative projects, in terms such as the role of the entities, their type and origin, their nature and culture, or the weight and power within the project, as well as the relationships between actors. A graphic representation of these issues will also be provided. These results shed some light over the roles of different organisations from the Triple Helix in supporting innovation, and suggest conclusions to improve strategic and technological decisions-making at an organisation level. Further discussion and development of the conceptual framework will be carried out, along with empirical work to test its validity through multiple case studies analysing research and innovation collaborative projects in Europe.

Keywords: Innovation Management, Success Factors, Collaboration
University-Industry Collaboration: A Systematic Review on Capability and Performance

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University-Industry Collaboration (UIC) has been extensively studied in both theory and practice since it is seen as a driver of innovation. However, it is argued that the body of this knowledge is still described as fragmented due to units of analysis, forms of collaboration, and contexts such as industries and countries. Prior studies attempt to gather evidence of UIC studies which is mainly about the motives of UIC involvement and determinations of successful collaboration. However, the knowledge of how firms and universities enhance UIC performance through capability-based view is still not well understood, and lack of comprehensive review. To address this gap, this study adopts the resource-based view and absorptive capacity theories to understand how capability plays a role in UIC. Furthermore, a systematic review approach is adopted to answer three questions which are (1) What are firms and universities’ capabilities that have been examined in UIC studies? (2) How are firms and universities’ performance measured in UIC studies? and (3) How do capabilities affect firms and university’s performance in different forms of UIC? Based on the findings from the review, this study develops the integrated framework to help academic and industrial practitioners decide what capability to be developed in order to enhance UIC performance. Lastly, this study concludes by presenting policy implications and future research direction.

Keywords: university-industry collaboration, capability, performance, systematic review
Innovation policies and open innovation: An analysis of Spanish innovation programs

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Open innovation (OI) has been defined as the deliberate use of external and internal knowledge flows to accelerate firms’ internal innovation and expand markets for the external use of innovation. Managing purposively flows of knowledge across firm boundaries may involve three types of OI: inbound OI, related to leveraging external knowledge sources through internal processes; outbound OI, aimed at leveraging internal knowledge through external commercialization processes; and coupled OI, which combines inbound and outbound processes. Firms can implement these OI types through a variety of practices.

Despite the relevance of OI for firms’ competitiveness, firms’ abilities to leverage and combine internal and external knowledge flows cannot be taken for granted. In this context, innovation policies can play a crucial role in stimulating firms’ OI, by shaping the innovation systems in which the agents that compose them interact, create and jointly exploit new technological and market opportunities.

In this work we study the degree to which existing public innovation support initiatives at a national and regional level promote firms’ OI and assess how they can be improved to facilitate their effectiveness for participating firms. In doing so, we review the set of innovation instruments developed by Spanish national and regional governments and analyse how they relate to inbound, outbound and coupled practices. Preliminary findings show that they focus at a great extent on fostering cooperation. Coupled OI is mainly fostered through support to regional clusters. Specific actions aimed to facilitate outbound OI are more limited.

Recommendations for policy makers include development of measures aimed at supporting less traditional OI practices (e.g. user communities, repositories for intellectual commons), and extension of current instruments to foster cooperation and participation in networks with complementary measures that help firms effectively achieve OI benefits (e.g., facilitation of partners search, negotiation skills).

Keywords: innovation policy, open innovation practices, national context
Measuring impacts of smart city projects: Triangulum’s Quadruple Helix innovative approach

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Abstract:
By increasingly involving urban actors in smart urban initiatives, cities are expected to adapt and make effective use of new smart solutions that have long-term positive impacts for people and cities. Demonstrating that desirable impacts are achieved, relative of the set objectives, raises both methodological and implementation challenges. Complementing general views of the smart city as a blend of institutions, processes, people, technology, and data this paper elaborates on the role of the Quadruple Helix in defining and measuring impacts of smart city projects, based on co-production of assessment criteria and indicators that are relevant to the context and stakeholders’ needs. The experience of 29 smart city module projects in three European cities - Manchester (United Kingdom), Eindhoven (The Netherlands), and Stavanger (Norway) - is presented in context of the Triangulum project - a Horizon 2020 Lighthouse project, funded by the European Commission. By adopting a ‘Quadruple Helix’ approach that is grounded on partnerships between public sector, private sector, universities, and citizens, Triangulum aims to develop cutting-edge smart city solutions across the domains of energy, mobility, and ICT to underpin sustainable smart urban development. Using a novel Monitoring and Assessment Framework, a Seven-Stage Methodology for Developing Indicators and Calculating Impacts is implemented in local module projects to discover whether those that are involved in smart cities are able to implement them successfully – in the sense of achieving the impacts they wish through appropriate system and a collaborative process for measuring their performance. The paper presents the results of the study and makes propositions about the challenges and opportunities that Quadruple Helix offers to local smart initiatives in pursuing achieving the desired shared impacts. The current paper contributes to the development of new methods and metrics for Quadruple Helix in the smart city, based on the co-production of indicator system and assessment process.
Natural Laboratories (NLs) are milieus with hardly-replicable geographic characteristics that enable the advancement of science. Increasingly, countries are exploiting the scientific potential of NLs, often through international collaborations and Big Science projects. Despite this trend, there is no theorization about NLs nor how countries can take advantage of these laboratories for scientific, technological, and institutional development. The purpose of this paper is to develop a framework for analyzing spillovers from NLs and to determine how the characteristics of the host country affect the generation, distribution, and capture of those spillovers. We conducted an in-depth case study of the astronomic observatories built in Atacama Desert in Chile. This NL will concentrate almost 70% of the world’s astronomical infrastructure by 2020. Through 43 semi-structured interviews with government, industry and science stakeholders; on-site observations and secondary data analysis we found that when NLs are exploited via international collaborations involving Big Science projects, they can generate innovation, institutional and cultural spillovers. Innovation spillovers occur mostly where the technology is developed and the capture of those spillovers is contingent on the absorptive capacity of local industry. A recommendation for host countries is to participate in development of technological components involved in the Big Science project; prefer scientific projects with modular technologies; and foster (or attract) firms with technological capabilities. NLs can also foster institutional development and impact culture. The Ministry of Foreign Affairs has an office for attracting new observatories, and the government is using astronomy to enhance Chile’s international image. Institutional and cultural spillovers are thus intertwined: cultural changes can shape stakeholders’ priorities, which in turn affect institutions. Overall, NLs offer opportunities for host countries to shape their Regional and National Innovation Systems. The exploitation of NLs is, therefore, a novel science policy tool particularly relevant for developing countries, as discussed in the case of Chile.

Keywords: Natural Laboratories, International Collaboration, Big Science Centers, Spillovers, Developing Countries.
The impacts of science parks, as innovation intermediaries, in university-industry research collaboration have been extensively investigated since science parks are expected to facilitate the effective collaboration and increase innovation capabilities and competitive advantages of firms. Most researchers assess such impacts by comparing the performance of firms located in the parks with the ones located outside the parks. Furthermore, most of them investigate science parks in the context of developed countries, for example the US, the UK, and Sweden, and high-technology industry, such as, pharmaceutical and IT firms. However, few studies focus on roles that science park play in the collaboration between university and industry and the impacts of such roles on the effectiveness of the collaboration. Moreover, the contexts of developing countries and other types of industries, such as agriculture or low technology sectors are less studied. This research therefore aims to address the gaps by investigating roles of science parks in the context of a developing country, which is Thailand, focusing on the agriculture-based sector and answering two research questions which are (1) what are roles of science parks as innovation intermediaries in university-industry research collaboration? and (2) how do such roles influence the effectiveness of university-industry research collaboration? This research adopts a qualitative approach with a semi-structured interview strategy and selects 19 agriculture-based projects in science parks in the northern region of Thailand. Three participants in each project: university researcher, firm and science park’s project manager, are the target interviewees. Based on the initial findings from interviewing 49 participants, it is found that science parks in Thailand play several innovation intermediary roles, including information providing, brokering, resource providing, mediating, and supporting for the outcomes of the collaboration. It is also found that these roles have impacts on the collaboration leading to the project’s effectiveness. The results of this research have several the implications for both policy makers and the management of science parks as well as for future research.

Keywords: university-industry collaboration, science parks, innovation intermediaries, intermediary roles
Exhaining Hidden Value in Site Decommissioning through a Shared Value Approach

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This research focuses on whether and how companies can leverage innovation ecosystems to create shared value during site decommissioning.

Amplified by globalization, digitalization and internationalization, the increasingly critical and complex issue of site decommissioning inflates the brownfield problem, which negatively affects company (reputation, missed opportunities) and society (economic, environmental and social impacts).

Traditionally, companies managed site decommissioning through pure real estate processes and literature on turnarounds studied the individuation and preservation of still strategic resources, considering the not valuable ones as liabilities to be divested.

However, recent evolutions of the role of firms are asking for new guidelines in this field. Firms - as not isolated entities, but capable of creating shared value in their network - are acknowledging the complexities of innovation ecosystems and their potentialities for value creation, especially while managing highly impacting interventions, as the decommissioning of industrial sites.

To contribute to this debate, the research longitudinally analyzed the case of an Italian energy company that is dealing with the phase out of 23 industrial sites, in various Italian regions.

The case showed the evolution of the strategies enacted towards an increasing and anticipative involvement of local stakeholders: this helped the company understand how to exploit resources of the sites, individuating innovative and sustainable solutions.

Results show firms can enhance their competitiveness by investing in projects and activities aimed at developing and improving through innovation the local clusters where they operate as a central part of their business strategy.

Theoretical contributions are provided to the discussion on “Innovation ecosystem” as shared value creators and on the study on innovative decommissioning strategies. Practical implications emerge for managers and policy makers: they both can be inspired on how to re-shape their roles and interact to develop innovative local clusters for shared value creation in site decommissioning.

Keywords: Innovation Ecosystem, Shared Value, Industrial Site Decommissioning, Stakeholder Engagement
Creating a favorable legal framework for the Brazilian triple helix - a 20 year saga

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The legal system is a key difference between the countries in which the Triple Helix model was conceived and Brazil. Common law is generally uncodified; civil law, in contrast, is codified in minutiae. Countries with civil law systems, such as Brazil, tend to have comprehensive, continuously updated legal codes that specify all matters capable of being brought before a court. Under a civil law regime, the effectiveness of Triple Helix arrangements is significantly affected by the legal framework. There have been considerable difficulties in establishing private-public partnerships, as Brazil is a civil law country that is governed by laws and statutes for each area. Therefore, the relations between business organizations and research intensive institutions, mostly belonging to either the Federal or the State spheres, have been historically hindered.

The paper will analyze 20 years of efforts to create a favorable legal framework for the Brazilian Triple Helix, as follows: (i) the enactment of the so-called Federal Innovation Law, a convoluted process that began in 1999, inspired by the French “Loi sur l’innovation et la recherche”, and was concluded in 2005; (ii) the 2006-2010 period, when the high expectations associated with the Federal Innovation Law were increasingly frustrated; and (iii) the formulation and implementation of the second wave of changes in the legal framework, benefiting from the lessons learned by industry, academia, and government. This process began in 2011, with an attempt to create a comprehensive Innovation code, and was pivoted as a group of more than 50 institutions from all segments of the Brazilian Triple Helix coalesced, establishing a lively platform for interactions. As a result, the Federal Constitution now includes innovation as a national goal, and a set of new laws were enacted. This process concluded in February 2018.

Keywords: Triple Helix, Brazil, Legal framework, Innovation Law
Success Factors of knowledge and technology Commercialization in Research Organizations – A Meta-Analysis

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Purpose
Companies increasingly outsource their R&D activities to external organizations. In this context, research organizations are important partners due to their infrastructure and expertise. Additionally, the increasingly competitive environment of Universities and Public Research Organizations (PROs) forces scientists towards the commercialization of research results. The academic literature offers myriad of papers on this topic. Unfortunately, the empirical results are contradictory and often fragmented. Therefore, it is surprising that except from qualitative reviews no comprehensive (quantitative) analysis exists. This study addresses this gap by conducting a meta-analysis to identify the factors that influence the commercialization of knowledge and technologies in research organizations. Hence, the research questions are:

1. Which factors influence the commercialization of research?
2. To what extent do they influence the commercialization?
3. How do these factors differ between commercialization channels (license; spin-off; industry research; training)?

Methodology
A meta-analysis integrates the research results on a certain topic and thereby reveals general patterns and hidden relations. Due to the meta-analysis statistics, it is possible to study the effect size of certain factors and their strength. Additionally, moderator variables will be analyzed, like countries; organization type, existence of TTO, sectors, study design. Especially moderator variables country and sector allow inferences to the innovation system.

Preliminary findings
Given that this study is still in progress, only descriptive results are available. The findings will provide a comprehensive picture on the current quantitative research about the commercialization of research results. It will provide an overview of important factors differentiated by the channels and reveal which factors need further research.

Practical implications
TTOs benefit from this study considering that provided factors represent starting points for the development of formats to enhance the commercial engagement. As this study is part of a research project of Fraunhofer Gesellschaft, the results will be basis for a recommendation tool, which supports the decision about commercialization channels for research results.
Assessment of performance indicators of innovative activity of subjects of the Russian Arctic

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The article analyzes the key performance indicators of innovative activity, patenting activity, production of innovative products and state support for innovative activities, state capacity and the implementation of cluster programs in the constituent entities of the Arctic zone of the Russian Federation. The results of the comparative evaluation of key indicators of scientific and educational complex, business and government in the Arctic regions and the rating of the composite index level of innovative development of the subjects is made on the basis of the concept of the Triple Helix Model.

The efficiency of realization of innovation policy largely depends on the system of performance indicators underlying the definition of innovation activity and monitoring of its development. In this regard, one of the main tasks in this direction is the formation of a set of indicators to measure the level of innovative development of the region considering necessary means and resources.

To achieve these objectives, beginning in 2012, programs of development of clusters as elements of the innovation systems of regions have been implemented. However, management practice still doesn't have universal approaches to the assessment of innovative level of regional development, which impedes the adequate evaluation of the impact of the state innovation policy at the Federal and regional level and the effectiveness of budget spending.

The regions of the Arctic zone of the Russian Federation have considerable innovative potential, which has not been yet fulfilled. Its effective use involves a concentration of resources to maintain relatively high educational level, the development of a network of universities, academic institutions and other public scientific organizations, the formation of a new scientific and technological base. This should facilitate the establishment of a knowledge generation system, stimulation of business activity, and ultimately the organization of production of goods and services competitive on the world market.

To conduct a rapid assessment of innovative development level of the Arctic zone of the Russian Federation it is possible to use a simplified system of key indicators that characterize the efficiency of innovative activity of scientific-educational complex (SEC), business and the state (the triad).

The key indicators of innovative activities selected for the analysis and evaluation adequately reflect the real picture of the current state of innovative development of subjects of the Russian Arctic on the basis of which it is possible to formulate certain scientific and practical recommendations for the adoption of various management decisions. The technique will improve the level and quality of strategic planning and management of innovative economy development in the regions of the Arctic territory.

Keywords: innovative development, innovative production, budgetary expenditures on science
Developing entrepreneurial spirit to minimize woman and child violence: an experiential program in West Java

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The numbers of Indonesian women and children facing the violence from their environments are still increasing though the laws to protect them are being enforced. Human trafficking and sexual abuse become the prominent cases for last five years and the worst is involving the closest relatives as the main actors. Analyzing the various reasons causing women and children threatened, the dominant factors are the economics and the parents’ absence of protection and nurturing. The research aims to find out how the government, the university, the industry and the community solve the problem to minimize the risks of violence against women and children in West Java. Using the descriptive qualitative method, the research reveals the efforts of the institutions through the quadruple helix. The results show West Java Government implementing the laws and policies by conducting some programs and one of is the establishment of the Centre of Integrated Service of Woman and Child Empowerment (P2TP2A) whose roles are to prevent the violence through some campaigns, publications and socialization and the utmost activities are to provide treatments for the violence victims and prepare them to be able to reintegrate into their family and society. P2TP2A cooperates with some universities in empowering both the violence victims and the risky ones by conducting training to encourage them having entrepreneurial spirit and being independent economically. Some industries are also invited to hire the victims working or give opportunities for them to get internship. Another current program is the community based protection and nurturing focusing for the abandoned children. For the future, it is crucial to implement quadruple helix scheme preparing whole institutions involved in empowering the victims or the risky of violence therefore they become the survivors to continue better lives and no more violence against women and children in West Java.

Keywords: violence, entrepreneurship, empowerment, quadruple
The dilemma of societal alignment in responsible research and innovation

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Abstract

Around four decades ago, David Collingridge put forward a dilemma that has been widely adopted amongst the technology assessment (TA), and later, responsible research and innovation (RRI) communities. The so-called Collingridge dilemma has permeated discussions on the governance of science, technology and innovation, enclosing an enormous challenge: that of anticipating their potential consequences and controlling emerging technologies. In this paper, we outline and reflect on some of the key challenges that influence the development and uptake of more inclusive and responsible forms of science, technology and innovation. Our analysis draws on a large body of empirical and theoretical research done by the different authors to reflect on challenges emerging from the complex and diverse organisational characteristics of universities, the enactment of responsibility in the private sector, the emergence of bottom-up, grassroots innovation and the hidden dimensions of sustainability, equity and transdisciplinarity. Taking these together, we paraphrase Collingridge’s famous dilemma of social control of technology to introduce a complementary dilemma which might be useful in the study of RRI, that of ‘societal alignment’ in science, technology and innovation. The dilemma of social alignment differs from that of control in at least five dimensions: a) the epistemic communities involved, b) governance mechanisms, c) ‘nature’ of the problem, d) backward or forward looking focus and e) scale and scope of sociotechnical systems. By starting to unpack this concept, we outline an agenda that remains scattered and overlooked among some communities in the field of the governance of research and innovation.

Keywords: inclusive innovation; responsible research and innovation; societal alignment; governance of science, technology and innovation
Rethinking industry, government and university relations within Brazilian Basic Sanitation Sector

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The research analyses technological development and innovation dynamics in the Brazilian basic sanitation sector, which includes water supply and sewage services. This analysis becomes relevant in the face of the few studies focused on the innovation process in this sector and the reductionist view on innovation in regulated sectors, commonly seen as supplier dominated. In order to investigate the innovative dynamics of this sector, and more particularly, the role of State Basic Sanitation Companies (SBSC) that are responsible for the basic sanitation of 70% of Brazilian cities, the research was built under an interdisciplinary approach focused on sectorial systems of innovation. The research is supported by national secondary databases and by data obtained from a structured questionnaire with Brazilian SBSC. The results show significant innovation rates in SBSC, as well as investments in R&D activities on a continuous basis. In addition, universities and research institutes proved to be great partners of the SBSC for the development of innovative activities. Government is seen as having a great relevance for the creation of an institutional framework - regulations and laws - that positively influences the advancement of technology and innovation in the sector. Nevertheless, policies oriented towards technology development and innovation in the sector are fragile and underutilized. As a result, it is possible to sustain that certain assumptions about development and innovation in regulated sectors are empirically proven in that research, but they occur in a more complex form: there are a myriad of actors beyond suppliers that contribute to innovation dynamics in the sector, as well as different dimensions of the institution context that incentivise and also limit these kind of efforts.

Keywords: Basic Sanitation, Regulated Sectors, Technology and Innovation.
A tale of a city: evaluating Manchester’s Internet of Things demonstrator

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Abstract: The recent era of increasing urbanisation has coincided with the rapid growth of a wide range of information and communications technologies and has led to various attempts to harness these technologies to address the needs of those living in cities. A key objective of these attempts is to realize the ‘smart city’, in which effective integration of physical, digital and human systems in the built environment, transport infrastructure, public services, cultural and community-based activities is presented as a means to deliver sustainable, prosperous and inclusive futures for its citizens. Central questions for Triple Helix scholars concerned with the roles of public and private sectors, universities, and citizens are what has been learned so far from a number of implementations of ‘smart city’ technologies in terms of what such technologies can achieve, and how best should smart city development and operation be governed. Much smart city development has currently resulted from pilot or demonstrator programmes, which are on a small scale but which are beginning to provide some answers to these key questions. In this paper we consider one of the most important UK programmes in recent years, the CityVerve programme, in which the attempt has been made to demonstrate a number of smart city underpinning technologies, commonly referred to as Internet of Things (IoT), in the inner city of Manchester in northwest England. Our paper draws on the literature of smart city and IoT evaluation in elucidating the achievements of the CityVerve. We focus on two aspects of the programme: we draw lessons from the CityVerve IoT demonstrator programme for the implementation of the smart city generally, but we also consider the influence of the design and management of the demonstrator programme itself in terms of influencing the outputs and outcomes of CityVerve.

Keywords: smart city, evaluation, Internet of Things, Manchester Demonstrator
Using social network analysis to assess the transformation of university

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The relation between university and society is an important theme because knowledge production and utilization has become a significant factor in economic and social terms, and because the university is a locus of excellence for knowledge creation. Recently, universities’ transformation thesis have stated that the relationships between universities and society are in a process of change. Universities have gradually abandoned their isolated, ivory-tower, discipline-based knowledge production mode, towards a more open, interactive, multidisciplinary and connected stance that favours applied problem solving. Common critiques to these thesis include the argument that there is a lack of empirical evidence, and point to an excessive generalisation which disregards the specificities of different disciplinary areas. In this research we intend to address these critiques, particularly the critique that points to the lack of empirical evidence, by looking at the literature on the relations between university and society that utilizes the methodology of social network analysis. Using this methodology it is possible to identify the importance of the university institution in networks, and as such, to empirically gather evidence as it respects the above mentioned critique. The research methodology is entirely based on literature review. The results show that the academic institution, and the people affiliated with those institutions, is highly connected with external entities and has, in several ways, a quite important and even central position in the networks on which it participates. Thus, the analysis seems to provide empirical ground to the universities’ transformation thesis, which has implications in terms of university governance. The academic institution is very important for society and it is important to understand and to know the basis of that importance. This paper is informative in that respect and it explores theories about changes in the university institution and university governance implications.

Keywords: university-society relations, social network analysis, knowledge production, university transformation, university governance
The database of publications about the Triple Helix (3H) movement was created in 2009 as an initiative related to the VIII International Conference, realized in 2010 in Madrid. The local organizers felt the need to know the academic outputs from previous conferences to define the relevant themes to the call for papers. The aim was to combine traditional topics with new ones proposed by the local actors/partners. Additionally, to identify the leading authors and institutions with the objective to invite them to participate. Also to find relevant institutions which are not partaking and attract them.

Since 2011 the database of publications is a project leaded by the Triple Helix Research Group (THERG-Brazil), hosted at Fluminense Federal University. Annually an updated version is released, and the purpose of this publication is to present the 2018 version. Preliminary versions were launched in 2010 and 2013 conferences.

The paper is an applied exploratory research, useful to the academic conferences organizers and researchers who can find literature sources or gaps/problems/themes to academic research. The database allows the use of bibliometric techniques to analyze the scholarly production of 3H. The advantage over databases like Scopus or Web of Science is the accurate registration focusing also communications on conferences, seminars, and books.

The database has 2,700 inputs (24% journal papers, 70% conferences communications, and 6% books, chapters and other). These communications were written by 3,465 authors, a mean of 1.28 authors per work. As expected, the creators of TH concept Henry Etzkowitz and Loet Leydesdorff, together or with many different partners, are responsible for 9.4% of all communications. Lastly, countries like Brazil, UK, USA, Russia, and Italy are very active in the movement and organize a conference was crucial to the dissemination of the concept in their countries.

Keywords: Triple Helix movement; database; publications
Innovation platform as mechanism for resource mobilization and enabling knowledge spaces for low carbon economy

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The interdependent challenges of climate change need innovation in systems of practice and provision, not single innovation in products and processes. In this context, regions and cities face the challenge of dealing with climate risks and impacts, while moving to more sustainable, zero-carbon and resilient pathways. This is a major opportunity for a new, sustainable market to combine existing knowledge and economies of scale that exist within territorial strategies to produce new systemic solutions. However, there are considerable differences in progress between the leading geographies (mostly in Northern/Western Europe) and the one's lagging behind.

Intra-EU disparity claims for the existence of platforms that follow a systemic approach instead of “picking the winner”. The structures which allow for the coordination of a variety of actors by combining individual goals and capacities with shared purposes, norms and expectations, refers to innovation platforms. This paper addresses the role of innovation platforms as catalysers of existing (or new) innovation systems in the field of low carbon economy to explore market opportunities.

Empirically, emphasis is put in the analysis of the underlying factors of geographical structural differences and what are the patterns of relations between knowledge spaces and governance configurations. For doing so, we analyse with method triangulation including network analysis technique the portfolio of projects of the EIT Climate-KIC in two thematic areas Urban Transition and Sustainable Land Use. Preliminary results show some patterns of specialization and discontinuities among different geographies while system integrator role emerges as a distinctive characteristic in the leading knowledge spaces.

This study aims to contribute to a better understanding on innovation platforms as a mechanism to accelerate innovation in the urban environment that can contribute to enhance collaboration to achieve more equally distributed progress across all Europe.
The role of intermediaries in the commercialisation of research from PROs

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Government investment in R&D and innovation is seen as crucial to sustain long term economic competitiveness; in fact, government-funded research, performed by both universities and public research organizations (PROs), can not only advance frontier scientific knowledge but also provide useful inputs for business innovation. While there is a growing literature on the interactions between university and industry and on the channels through which academic research is commercially exploited, much less attention is paid to PROs’ involvement in these processes. This study addresses this research gap by investigating what are the factors that underpin PROs’ effective transfer and commercial exploitation of knowledge, focusing in particular on the role of intermediary organisations. Intermediaries, consisting of a wide range of heterogeneous organizations (Callon, 1994), can play significant roles in innovative activities by connecting various components of innovation systems in a responsive and proactive fashion (David & Metcalfe 2007). They can support researchers in identifying appropriate knowledge transfer channels, assist with the contractual and commercial development of interactions, and match researchers with firms’ innovation requirements (Perkmann & Walsh, 2007).

This study exploits a unique, purposefully constructed panel dataset of 50 PROs in the United Kingdom, built from public administrative records (annual reports and financial returns) between 2012 and 2017. Preliminary findings suggest that reliance on external intermediaries to commercialise research has a positive effect on PROs’ ability to generate income from private sources, while the use of external intermediaries to support the provision of services (such as consultancy and testing) does not make a difference compared to the use of internal resources. The PRO’s involvement in inter-institutional networks via participation in joint ventures and through broader board membership are also associated with greater share of income from private sources. These preliminary findings point to the importance of appropriately managing research-focused interactions with external organizations in order to generate private income.

Keywords: Public research organizations (PROs), intermediaries, knowledge transfer, research commercialization
How the Triple Helix shapes the relationship between R&D and Productivity in the Automobile Industry

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The contribution analyses how the interplay of firms, research organizations and governments shapes the relationships between R&D and productivity growth in the automobile industry in Germany. In the public discourse, it is often assumed that there is a very narrow link between R&D, a major driver of technical evolution, and productivity growth. Our contribution shows that this relationship is far more complex than often assumed. In a first step, the analysis is based on statistical evidence that is drawn firstly from results of recent studies and, secondly, own econometric calculations based on a comprehensive firm database (Amadeus) containing data on German enterprises. We combine this evidence with qualitative results from expert interviews in order to analyse the relationship of firm R&D, innovation and productivity. In a second step, the influence of government interventions and activities of universities and research institutes are scrutinized. We look at the influence of government intervention at the example of interventions that promote emobility and their probable effect on future productivity based on a simulation study. The contribution finds that a detailed consideration of sectoral innovation systems is helpful for understanding the role of R&D as driver of productivity growth. We show that parts of the Triple Helix exert influences on the outcomes of R&D on productivity growth. The contribution concludes that there is, under Triple Helix perspective, no simple relation between R&D and productivity growth. In the future, more empirical work is required which takes into account sectoral constellations and the interrelationship between policy, business firms and research organizations.

Keywords: Automobile industry; productivity growth; Research and Development; Triple Helix
Formation and development of entrepreneurial universities is considered one of the features of successful regional and national innovation policy. Such universities play a vital role in maintaining competitiveness of national innovation systems by intensifying the process of commercialization of technological developments (CTR), and constitute a major part of the Triple Helix concept. The research aimed to analyze the experience of ITMO University in CTR and evaluate its educational programs in the area of technological entrepreneurship. This research made a conclusion regarding the efficiency of CTR-related ITMO activities and the place of ITMO in the Russian national innovation system, using synthesis of theoretical base related to Triple Helix.

This research aims to answer the question: what characteristics make ITMO one of the leading entrepreneurial universities in Russia? Which instruments of CTR used by ITMO are effective? Could other Russian and foreign universities learn from this experience?

Authors divided the stages of the development of Triple Helix theory into three stages: the preliminary conceptual stage, contextualism, and regionalism. Secondly, the authors considered the role of an entrepreneurial university in current Russian legislation and referred to the practical experience of ITMO in the field of entrepreneurship, its institutional elements and educational activity related to this subject. Finally, the third phase of the research included an interview with the expert of ITMO University, Kazin, who was the dean of the Faculty of technological management and innovations. The questions evaluated the effectiveness of certain programs of ITMO University and the educational programs covering innovation entrepreneurship.

Our research showed the main instruments of CTR are: institutionally supported start-ups, commercial research and development, licensing for the purpose of technology transfer to the business sector of the economy, business incubators and techno parks, schools of technological brokers, Foresight, and junior stock exchanges (alternative stock markets).
Role of Local Government in HET Development: Leadership Situation and Performance in Jatinangor

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Regional development leads to improved access, public service, and growth. The Higher Education Town (HET) Jatinangor area is growing along with development of campus academic activities, infrastructure supply, park of cultural technology science, and regional economic growth. On the other hand, there are challenges of spatial environmental change and economic activity, including uncontrolled apartment buildings and widespread flooding at the regional and surrounding levels. The areas affected by HET also are widespread over time. The basic question is how local government plays a strategic role in spatial plan, implementation plans, and program activity of Higher Education Town. Using the concurrent embedded strategy research method, the study found that leadership situation played a strong role in improving the performance of the HET area. A good leadership situation is able to build a strong network between local government agencies, with academics, businesses, and communities to streamline development of HET that benefits multi-stakeholders. Network between actors in HET will determine effectiveness of performance of quadruple helix. The study also learned that concurrent embedded strategy research methods have advantage of being able to analyze factors affecting the performance of HET region and observing leadership behaviors simultaneously. It is critical to selected capable local leaders in HET for directing leadership situation and at the same time improving performance of HET of Jatinangor according to spatial or sectoral plans.

Keyword: leadership situation, local, quadruple, university-town
In governance we trust. Experimentation at the interface between medical research and clinical practice.

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Previous research has paid attention to the role of hospitals as the locus of medical innovation. New medical devices, new pharmaceuticals, and new clinical procedures are being tried out either through clinical trials or as innovative therapies when no treatment is available. However, to protect patient safety and ensure ethical conduct, experimentation in hospitals is subject to regulation.

The purpose of this paper is to better understand the role of hospitals in bridging medical research and innovation, the challenges of that role, and how they can be addressed. More specifically, we investigate the governance of medical experimentation at the interface between the university and the hospital in the context of a recent crisis in regenerative medicine in Sweden. The case allows us to critically examine the different governance mechanisms that aim to balance innovation, patient safety and ethical conduct in hospitals, how they are intended to work, and how they failed in this particular case.

The paper makes two contributions to existing research. First, it extends the literature on the growth of knowledge in medical research and innovation by considering how regulation, i.e. the governance of experimentation, affects the evolution of clinical procedures. Second, while acknowledging the important role of hospitals as bridging medical research and innovation it provides a critical perspective by highlighting the challenges of experimentation and discussing how they may be addressed.

Key words: medical innovation; innovation governance; regenerative medicine
Small Business Innovation Research Programmes are a policy instrument employed in many countries. Their results and impacts have been described as central in developing start-ups and technology based companies worldwide. Some results are impressively similar amongst programmes from different countries. Amongst typical STI policies, SBIR-like programmes are probably the ones that have had their results and impacts evaluated most. There are evidences of positive impacts in terms of return on investment and job creation. However, the rate of success of companies is highly concentrated over 10% of the population of grantees. The so-called Phase III of SBIR-like programmes – the phase that supports market developments for new goods and services – has been seen as a important step forward in order to increase the rate of successful companies. Notwithstanding, the main issue to be tackled by SBIR-like programmes in order to increase impacts and to promote more successful companies relies probably in variables related to the ecosystem companies inhabit. This abstract is based on a quantitative and qualitative impact evaluation of the Brazilian SBIR-like programme funded by Sao Paulo Research Foundation (PIPE/FAPESP). The study was carried out in 2017 and 2018 and involved data from circa 140 companies that answered a structured web-questionnaire with more than 60 variables from five main dimensions: socio-economic data; governance; cooperation with external STI stakeholders; technology development; and innovation. We tried to evaluate outputs and outcomes of the past 10 years of PIPE/FAPESP, and to correlate these with indicators of their innovative environment. Complementarily, the study also compares this evaluation with evaluations carried out in different countries, both for the methodological approach and for the findings.
Does Signaling Matter for Knowledge Exchange in Emerging Economies? A Study of Indian Universities

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One of the key problems facing emerging economies is the presence of informational asymmetries between creators and users of knowledge. While advanced economies generally have a codified information base on the research carried out in universities, such information is generally missing in many emerging economies. Knowledge exchange (KE) in such contexts occurs without the support of research monitoring and quality assessment mechanisms generally found in advanced nations. Hence, the quality and reliability of university output and technology may not be readily visible to potential users, making the role of “signaling” by universities of key importance. In this paper we try to understand the role of such signals over and above the observable characteristics of a university in driving KE.

Using data from 186 Indian universities on research outcomes and incomes, and combining them with a recently introduced multi-dimensional ranking framework by the Indian government, we explore the role of two key signals – ownership structure and reputation among employers – in driving KE in presence of informational asymmetries. Our conceptual model incorporates both the direct influence of signals on KE performance, as well as its indirect effect as a moderator between research and KE. Our findings reveal that the impact of a signal is KE channel dependent. For the engagement channels such as contract research, with a long history in the Indian context, public ownership has a direct positive influence on income but no indirect influence. However, for traditionally less popular channels such as consultancy and commercialization, it is employer reputation which is relevant, as a direct positive influence as well as negative moderating influence on incomes from these sources.

Our results have key managerial and policy implications. The results also have a bearing on the nature of knowledge exchange in general within contexts with high levels of information asymmetry.
A new scenario is emerging where ubiquitous and unlimited connectivity fueled by broadband and mobility convergence, together with other societal, cultural and economic factors contribute to redefine the purpose and scope of digital inclusion projects in underserved populations.

AIM The aim of this paper is to offer a framework centered on the interplay of Innovation, ICT and Development. We adopt a conceptualization of the Digital Divide as a multidimensional phenomenon, conceived as a process more than a condition, regarding the acceptance, adoption, application and appropriation of digital technology.

RELEVANCE Our conceptualization allows the consideration of different intertwined “divides” that coevolve and interact in a dynamic and complex fashion requiring the development of epistemic, conceptual and action frameworks in order to acquire an integrated approach toward the understanding of the implications and impact of digitalization in society.

METHODS In the development of our framework we draw on the principles of complex systems.

FINDINGS AND IMPLICATIONS We propose that national and regional agencies in charge of defining and implementing the agendas for digital inclusion, particularly in rural and underserved communities- consider comprehensive social action plans conducive to connect ICT with community prosperity. This paper includes the identification and discussion of the elements involved in the interplay between innovation, ICT and development as crucial components of a system that might be conceived in its dynamics as a Triple Helix for digitization. In our proposed framework, technology becomes an important enabler, but not the main objective. Though we have at our disposal powerful converging tools with great potential for development, our experience in the implementation of digitization interventions in underserved populations, suggests that the challenge is still of human and moral development nature.

Keywords: Innovation, Sustainability, Complex Systems, ICT
The Aloha.Digital Project—Adding the Sixth Helix to the Quintuple Helix Innovation Model

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The Quintuple Helix innovation model advances the core Triple Helix by contextualizing the synergistic alliance of the four constituents of the institutional spectrum in an advanced democracy as an emerging governance framework guided by the principles and values of the knowledge society and bound by the environmental sustainability imperative.

The ongoing research project described in the paper argues that the effective application of the Triple-Quadruple-Quintuple Helix innovation model necessitates the introduction of the sixth critical component—defined by the authors as an *intersectoral digital commons*—to render requisite structural, functional and performance integrity to the mutually orchestrated act of continuous innovation.

The main component of the territorial digital commons is a community-focused metanetwork of Web-based nodes engineered to compensate for region-specific knowledge and collaboration deficiencies, to facilitate equitability through the recalibration of knowledge flows, and to provide material encasement and communication vehicles for the governance-through-innovation discourse and other pertinent discourses advocating for positive social transformation.

The authors introduce the taxonomy of such a metanetwork’s nodes and argue that the university’s increasing role in co-steering regional innovation systems should include governance, knowledge curation, and technology stewardship of the community’s at-large digital knowledge commons. Of the four institutional segments constituting the regional innovation system, academia appears to be most appropriately suited—programmatically, axiologically, organizationally and technologically—to inspire and spearhead innovation efforts in an enduring, comprehensive and epistemologically and ethically vigilant manner.

The paper reports on the first stage of this ongoing mixed-method investigation and iterative design project that capitalize on a grounded theory and participatory action research approaches. This research effort is powered by an emerging grassroots network of university-based living labs that is using this project to advocate the establishment of Hawaii’s Center for Community Informatics and Digital Transformation.

**Keywords:** Digital commons; regional infoscape design; regional innovation systems; social informatics, knowledge curation; science-policy/science-society interfaces
The aim of this paper is to explore new avenues to understand the societal impact of research in the humanities. Building on work by Benneworth et al. (Benneworth, P., Gulbrandsen, M., & Hazelkorn, E. (Eds.) (2016) *The Impact and Future of Arts and Humanities Research*. London 2016, Palgrave Macmillan) I propose a model of societal impact in terms of social capacities. I will argue, firstly, that meeting societal, economic, environmental, and political challenges requires societies capable to deal with change and, secondly, that we can understand and theorise social capacity through Nussbaum’s and Sen’s capability approach and Miranda Fricker’s theory of epistemic justice (Fricker, M. *Epistemic Injustice. Power and Ethics of Knowing*, Oxford 2007, Oxford University Press). The main aim of the paper is to show the contributions made by research in the humanities to building social capacities. The paper is based on an analysis of cases of impact in the humanities collected within the COST network ENRESSH (enressh.eu). The cases show a wide variety of societal impacts amenable to analysis in terms of capabilities and epistemic justice. The results can have implications for how to understand and evaluate societal impact beyond the humanities and they are valuable for the Triple Helix framework as they put the focus on the local epistemic community.

Keywords: humanities, societal impact, value
The effect of managers’ affective evaluations on perceived risks and benefits of collaborating with universities: a sentiment analysis

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Collaborations with external organizations are increasingly important for companies’ ability to engage in continuous innovation. If managers perceive their collaborations as unsuccessful, they may reduce their external engagement, with negative consequences for their companies’ innovation prospects. This paper examines how managers’ perception of the benefit accrued from collaborating is influenced by their perception of the collaboration’s risk, and by the moderating role of affect. Relying on a dataset of 415 collaborative projects involving university and company staff, we find that the perceived risk of a collaboration is negatively correlated with its perceived benefit and this relationship is mediated by managers’ negative affective evaluation. However, a positive affective evaluation of the collaboration has a moderating effect, reducing the positive relationship between perceived risk and negative affect and increasing the perception of benefit, even in the presence of high risk. As perceived benefit is found to increase the likelihood to engage in further collaborations, managers’ affective evaluation generates actual impact on their companies’ future collaborative engagement with universities. Our findings recommend that managers should adopt a positive attitude when engaging with collaborators from external organizations, which can reduce the negative impacts of perceived riskiness of the project and increase their likelihood to collaborate again.

Keywords: Perceived risk, perceived benefit, affective evaluation, university-business collaborations, sentiment analysis.
The role of universities in public procurement of innovation

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The “Triple Helix” model shows the dynamics between University, Industry and Government in terms of innovation. Although innovation can be enhanced by boosting their relationships in several ways, this paper focuses on this interactive triangle regarding to public procurement of innovation (PPI) and pays special attention to the role of the university as a driving force in generating innovation through this instrument.

In doing so, we take the concept of «Innovation partnership» as a starting point to examine how Spanish universities can be involved in an Innovation partnership, either as assisting procurers, as procurers themselves or even as contractors. In Spain this concept was enforced by the Public Procurement Act 9/2017 of 8\(^{th}\) November, and obeys the transposition the 2014 package of European Public Procurement Directives which foster the innovation both at early commercial and later implementation stages, resulting in two types of Innovation Procurement: the Pre-Commercial Procurement (PCP), and the Public Procurement of Innovative Solutions (PPIs).

To illustrate the particularities of PPI process, the main drivers and barriers that face universities in implementing PPI, we carry out a multiple case study as we draw on the experiences of three Spanish universities that pioneered the implementation of public procurement of innovation. Our results show the potential of PPI as a tool for facilitating innovation from universities and highlight the need to involve different organisations and actors to assure strong coordination to overcome the difficulties.

Implications arise for innovation policy makers since specific actions to enhance the use of PPI by universities should be carried out. Also, from the university perspective, a strong leadership and commitment towards PPI constitutes a prerequisite for the effective implementation.

The “Triple Helix” model [Etzkowitz (1993) and Etzkowitz & Leydesdorff (1995)] shows the dynamics between University, Industry and Government in terms of innovation. Although innovation is achievable in several ways, this paper focuses on this interactive triangle regarding to public procurement.

First of all the legal framework will be explained, taking special attention to the possibilities offered by the so-called «Innovation partnership». In Spain this concept was enforced by the Public Procurement Act 9/2017 of 8\(^{th}\) November, and obeys the transposition the 2014 package of European Public Procurement Directives which foster the innovation both at early commercial and later implementation stages, resulting in two types of Innovation Procurement: the Pre-Commercial Procurement (PCP), and the Public Procurement of Innovative Solutions (PPIs).

Therefore, in view of this new approach of public procurement and according to the Triple Helix theory, it is appropriate to deepen into the role of universities, promoting technological development and economic growth (Chang, 2010). Certain Spanish Universities were forerunners, such Extremadura (LABpole project), Cordoba (Broca and Innolivar projects), and Polytechnic of Valencia (Cubípodo project). Universities could be involved in an Innovation partnership, either
as assisting procurers, as procurers themselves or even as contractors. In any case, Universities as knowledge institutions are called to lead social progress and State-society relationship.

Keywords: University social responsibility, public procurement, innovation partnership,

Evaluating cluster policy though the collision of theory and practice

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Cluster policies rely on triple helix engagement to promote collaborative dynamics that can boost regional competitiveness. The impacts of these policies are notoriously difficult to assess. Academic approaches to cluster policy evaluation are fragmented and often ignorant of data-collection possibilities and specific needs of cluster policy-makers and practitioners. Policy-led approaches to evaluation often lack the structure to facilitate learning and improvement. As such there remain significant gaps between theory and practice.

At least five elements to the cluster evaluation challenge have been identified. Firstly, it is important to capture the more qualitative “human element” that is essential for the processes that help build a successful cluster. Secondly, there is a need to convert emerging academic analyses into the development of pragmatic indicators/approaches that have feasible data requirements. Thirdly, we must employ a combination of techniques and tools appropriate to different circumstances. Fourthly, approaches need to deal with the interactions that exist across policy levels, instruments and initiatives. Finally, all of these areas must be addressed in the context of a stronger emphasis on policy learning rather than audit.

The contribution of this paper is to reflect on a unique methodological approach over five years that has regularly brought together academics, policy-makers and cluster practitioners from around the world to collectively address these challenges. A series of 10 participatory workshops have been organized since 2012, each bringing together 20-40 participants. The regular nature of these activities has facilitated a progressive identification and exploration of cluster evaluation challenges that has integrated theory and practice. It has resulted in a concrete framework based on what would expect to be found in the ‘perfect cluster’, accompanied by a series of cluster evaluation guidelines and a specific survey bank.

This paper reports on the results of a Triple Helix approach to evaluating Triple Helix collaboration.

Keywords: Clusters, Evaluation, Policy Learning
Exploitation, Exploration and Entrepreneurial Networks: Performance Implication during SME's New Product Development

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The debate between maintaining core competencies and replacing with new ones has been predominant during new product development. As opposed to large firms which may possess enough resources, small firms draw on their networks as support for exploitative and explorative activities during new product development. Using a network perspective, we argue that exploitation needs a trust-based network characterised as having a low network size, a high network density and strong ties. Conversely, exploration needs an information-seeking network, high network size, a low network density and weak ties. We argue that small firms use similar network contacts or redundant networks to perform both exploitation and exploration simultaneously. Our analysis found the presence of a non-linear relationship between the network and performance during new product development. This study extends the empirical research on ambidexterity in the context of small firms and new product development. We offer an alternative approach to existing studies which have heavily focused on the internal aspect of organisation and overlooked the role of external actors. The findings also have practical implications, where firms need to find a balance between their resources and networks.

Keywords: Exploitation, exploration, ambidexterity, network, new product development.
Makerspaces, Hackathons, and Pitching Competitions: New Intermediaries between Triple Helix Actors

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Abstract: Start-up incubation has grown rapidly over the past decades, not only in numbers but also in diversity. New forms of institutionalized start-up support often provide rather unconventional measures of support for participating start-ups. This heterogeneity increases complexity for entrepreneurs, incubation shareholders, and policymakers alike. The paper thus seeks to characterize and analyze new forms of incubation that potentially act as intermediaries between triple helix actors. Conceptually, it approaches the models of Makerspaces, Hackathons and Pitching Competitions under the term of start-up incubation. Empirically, the paper investigates the historical development of this diversity and its current status. It develops a typology of incubation design elements addressing the fragmented literature in this area. In building on theoretical foundations of organizational sponsorship (Amezcua et al., 2013; Mrkajic, 2017), the study further analyzes how start-up incubation is subject to a functional shift. To understand the historical development of the variety of incubation and its current status, I conduct a keyword analysis using unique historical data from Google Trends, Twitter, Factiva, and NESTA. The paper then conceptualizes relevant incubation design elements, as well as a shift of organizational sponsorship. The keyword analysis supports the presumption of increasing heterogeneity and growing significance of rather new models of incubation. Based on a conceptual typology of design elements, the analysis reveals that Makerspaces, Hackathons, and Pitching Competitions provide increasingly specialized functions of support targeting specific needs of start-ups or founders in an institutionalized way. In particular, some life-cycle specific characteristics are defining factors. Further, the study provides evidence for an ongoing functional shift in start-up incubation: The role of bridging mechanisms has become dominant over buffering ones. New models largely focus on relational connections with the start-ups’ environment and related intangible resources. This challenges common assumptions on how incubators work as intermediaries for triple helix actors.

Keywords: Start-up incubation; Makerspaces; Hackathons; Pitching competitions; Incubation design
International Triple Helix in Action: Learnings from a Bavaria-Israel Digital Open Innovation Case

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The Triple Helix of University-Industry-Government enables a sustainable innovation ecosystem and promotes regional development. Open Innovation uses knowledge inflows-outflows to accelerate company’s internal innovation and expand markets. International Exchange support knowledge-share, new-market development and builds intercultural skills. Entrepreneurship Education taught through entrepreneurship foster an entrepreneurial mindset (i.e. knowledge, skills and attitudes), which is transferable, and hence, transdisciplinary. In this scenario,

- How to conceptualize a bilateral program to bring together the Israeli start-up culture and the German traditional engineering-based innovation culture?
- How to create value for all stakeholders (Government, SMEs, Universities, Entrepreneurship-Centres and Students) in the process?

Thus, a novel experiment designed to address these questions was co-created. The Bavaria-Israel Partnership Accelerator (BIPA) is government-funded and operationalized by two entrepreneurship centres (ECs) connected to entrepreneurial universities. Four editions were successfully delivered (2015-2017), engaging 20 Small-and-Middle-Size Enterprises (SMEs) and 82 Student-Participants (SPs). Each edition consisted of:

- Immersion Workshop: Nine days in-person. SMEs posted a specific innovation challenge. SPs formed binational teams (BTs) to tackle it. ECs taught concepts, processes, tools and assigned coaches.
- Virtual Acceleration: BTs worked remotely during 14 weeks to research, ideate and conceptualize a solution, assisted by coaches. BTs iterated and reported to SMEs on milestone meetings.
- Closure: BTs presented solution to SMEs.

Learnings from action research efforts during and after BIPA, point to an enriching intercultural and entrepreneurial experience, which satisfactorily addresses the proposed questions. Nevertheless, specific insights illustrated improvement opportunities in BIPAs design to approach e.g. short-comes on virtual interactions and SMEs readiness. Upcoming editions (2018-2020) review these and explore how to enable continuous collaborations post-BIPA. The main implication is the replicability of the experiment in other settings. Key learnings related to program design and international virtual collaborations will contribute to a lively discussion on geography and digitalization of Triple Helix interactions in the conference.

Keywords: International Triple Helix, Entrepreneurship Education, SMEs, Digitalization
Successful entrepreneurs, who have not completed their academic studies, increasingly emerge. To analyze whether academic studies have an influence on effectuation, the entrepreneurial decision-making logic, we conduct a mixed-method research on ten academic and non-academic entrepreneurs. Additional influence factors on entrepreneurial decision-making are explored and connected to theory. In doing so, this research depicts a contribution to existing research and may therefore help to mature the concept of effectuation.

Both, interview and questionnaire, support that entrepreneurs tend to use effectuation as a dominant decision logic. The results of the questionnaire suggest a slightly stronger preference for effectuation among non-academic entrepreneurs. However, based on the interviews, no noticeable difference is identified. Both, academic and non-academic entrepreneurs use effectuation ~80% of the time. Nonetheless, all entrepreneurs with an academic background would retrospectively study again as the resulting network appears to be a major takeaway of academic studies.

Environmental factors influence many decision in entrepreneurship. This can be related to two influencing factors. First, uncertainty levels of an industry may have an influence on the preferred decision-making logic. Entrepreneurs adapt effectuation according to the situation, which largely influences the use of strategic partnerships. Second, the age of a company influences the preferred decision logic of the founder.

As a result, we contend that in times of omnipresent knowledge, the academic institutions may have to prove their entrepreneurial purpose. Investing in research and fostering academic ambitions beyond the possibilities of individuals may be one of those. It seems that many academic institutions find themselves at the crossroad of sticking to current policies or applying research results to new policy changes. Policy makers should observe the development and findings of current research.

(1) Keywords: Academia, Effectuation, Entrepreneurship
The greening of industry: The role of clusters and cluster policy

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Much research has been conducted on the link between industry clusters, industry development and innovation. This has formed a basis for cluster policy implementation, and clusters have come to be considered focal tools for restructuring of regional industries. However, far less attention has been placed on the role of clusters and cluster policy in facilitating development towards a desired ‘direction’. Towards this, we discuss the role of cluster policy in contributing to green industry development and restructuring. Theoretically, we draw upon Evolutionary Economic Geography (EEG) and Transition Studies (TS). EEG has shown that policy for industrial restructuring should be linked to pre-existing regional capabilities, and that regional restructuring is primarily a matter of changing existing industry activities rather than developing brand new industries unrelated to previous economic activities. However, like cluster studies and cluster policies, EEG has been less clear on the ‘normative’ dimension of restructuring, i.e. the ‘direction’ of change. TS has this issue as its point of departure, and contributes with insight into how ‘desired’ economic shifts (e.g. green transitions) pan out. We believe that combining insight from EEG and TS is important for understanding the role of clusters and cluster policy in contributing to green restructuring in regional industries. To exemplify this theoretical argument, we discuss the role of Norwegian cluster policy in contributing to green regional restructuring. Through qualitative studies of three cluster projects—where we conduct both interviews, observation and document studies—within the same region in Western Norway, we identify different paths towards (green) restructuring. We argue that each of the three projects, focused towards maritime, marine and petroleum industries, respectively, have chosen different paths towards restructuring, and that not necessarily all of these imply a ‘greening’ of industry. Finally, we discuss implications of this for theory and policy.
Insights into different economic value determinants of patents

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The use of patent indicators has fascinated economists for a long time. While patents should meet the novelty and utility criteria to be granted in patent offices, the economic value of patents may not that high to be part of rapid advances and a lead to marketable products. However, there is no specific information on the most patent databases on whether inventions have been introduced in the market and therefore policymakers find it difficult to identify valuable inventions.

We analyze the determinants of patents to give economists a useful basis upon which to predict the economic importance of patents. The main objective of this paper is to present a practical approach employing a wide array of indicators which capture the economic value of patented inventions. These measures such as family size, forward citations, backward citations, grant lag, generality, originality, radicalness and patent renewals which we use in this study rely on data contained in the patent documents. This paper uses OECD dataset which contains the patent indicators calculated on European Patent Office documents published during the period 1978-2014. The study establishes statistical analyses to understand the potential value of the patents based on these indicators. The paper examines the relationship between different measures to rank patents and therefore discusses these measures over the Canadian triadic patents to focus on the most economically important inventions. Employing the econometric models, our findings suggest that some of these measures can give a useful basis on the economic value of inventions and may indeed help to understand the future potential of patents. Further, we find that some of these indicators are positively related to patent renewals and can be indicated the successful innovations and the probability of commercialization.

Keywords: Patent indicators, Patent value, Breakthrough, Patent renewal
Applying Machine Learning to Evaluate and Compare Research Grant Programmes: Selecting Researchers or Research Areas?

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Evaluating and comparing the performance of research funding programmes is challenging because programmes differ in how they (a) select grants and (b) select research areas for funding. Do programmes perform well because they are good at selecting research projects, or because they concentrate funding in high-output research areas? These mechanisms can be distinguished if we can identify and control for a set of research projects in common scientific areas. Previous approaches have used costly and arbitrary manual classification of research projects, or relied on coarse research groupings defined by bibliometric services. We propose a new solution: Apply machine learning to map research projects funded by one agency into the funding structure of a different agency, to control for common areas of research, and separately identify the effects of grant selection from research area composition. We apply our method to compare three high-impact high-risk research programmes funding early-career life scientists: The U.S. National Institutes of Health’s New Innovators Award (NIH-NIA), the European Research Council Starting Grant (ERC-StG), and the Singapore National Research Foundation Fellowship (NRFF). Altogether, these programmes annually commit over $300 million USD to fund an average of 200 leading early-career life scientists. We show that the NIH-NIA and NRFF concentrate research funding in selective life sciences areas, compared to the ERC-StG which by design evenly distributes research funding. Within common research areas, NIH-NIA and NRFF researchers exhibit faster growth in citations, and to a lesser extent publications, than equivalent ERC-StG researchers. This suggests the NIH-NIA and NRFF are able to select researchers who deliver superior research outcomes. Comparing our results to traditional cross-national analyses, we show that comparisons that ignore the role of research area selection generate biased estimates of performance.

Keywords: Machine Learning, Program Evaluation, Research Funding, Bibliometrics
Challenges and Opportunities of Big Data for Innovation Policy along the Policy Life Cycle

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What innovation policies are implemented depends on the relationship between the state and market, the cultural values of a society, the interests of stakeholders and of course, the political party that is in power. Nonetheless, scientific and academic research does play a role in innovation policymaking. As a result, evidence-based policymaking has emerged also related to innovation. The justification of innovation policy was originally rooted in perceived market failures and nowadays, perceived systemic failures in innovation systems and recently mission driven. However, how do you measure innovation in order to justify policy measures? In addition, what specific tangible evidence do innovation policymakers require? Traditionally, researchers have attempted to measure innovation through various indicators differentiated into input, e.g. R&D (OECD Frascati Manual 2015) and output measures (OECD Oslo Manuel 2005). There are several issues associated with traditional innovation indicators. Only focusing on R&D and patents for example, provides a narrow perspective on innovation in the manufacturing sector. Furthermore, R&D expenditures do not necessarily lead to commercial success. Innovative input must not necessarily involve formal R&D, but could also be user-driven. Furthermore, patents do not necessarily represent innovative activity or success in some sectors in addition to their biased value. Composite indicators reflect attempts in combining several indicators in providing a more complete picture of the innovative landscape. However, they also encounter limitations as they are inherently theoretically based and suffer from subjective choices and weighting problems. Moreover, a further serious criticism of traditional indicators is that they are outdated and suffer from significant time lags.

In contrast, policymakers require in the context of increasing scientific and technological dynamics timely evidence and information in order to make the most informed policy decisions. Consequently, in order to tackle these traditional limitations in innovation policy, modern technologies and sources such as ‘Big Data’ or ‘Web Mining’ can be used. Big Data provide not only more timely information, but can also respond to more specific inquiries at every stage of the innovation policy cycle. Web mining also complements the innovation policy process because of the proliferation of company websites (of all sizes) and thus captures trends and additional information. Naturally, data protection regulation needs to be taken under consideration. Using modern technologies might also transform the innovation policymaking landscape where policymaking becomes less stringent and much more pilot- or experimentally-based. Our contribution will elaborate the opportunities, but also the challenges of Big Data for the various phases of the innovation policy life cycle and possible implications for innovation policy in the future.

Keywords: innovation; policy cycle; big data
Entrepreneurial Research Culture Preconditions Innovation Ecosystem; A Case Study of Innovation Summit in Pakistan

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Innovation system is based on degree of triple helix model being exercised in a country. The high level of interaction between industry, academia and public sector determines effectiveness of innovation system. The relationship of innovation system and triple helix exercise is moderated by entrepreneurial research culture existing in the society.

The current study is conducted using qualitative inquiry approach and single case study method as strategy for investigation. The paper is based on the case study of innovation summit being organized in Pakistan for last five years. The innovation summit is planned to promote entrepreneurial research in academia and industry of Pakistan. The strong connection between academia, industry and public sector is resulted as outcome of this innovation summit. The entrepreneurial research drives the interest, connects science with economics, reduces trust gap and builds confidence of triple helix partners on each other’s. The phenomenon presented in the case study leads to theorization of relationship between entrepreneurial research and implementation of triple helix concept.

The paper helps policy makers to use entrepreneurial research as tool to practice triple helix and strengthen innovation ecosystem in the society.

Key words: Entrepreneurial Research Culture, Innovation Ecosystem, Innovation Summit, Pakistan
Democratisation of innovation systems: mapping new elements, interactions and conditions

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Keywords: Abundance, Democratization of Consumption, Quintuple Helix, Democratisation of Innovation Systems, Democratizing Innovation

Today, we are observing new waves of megatrends in the connected world (Lee et al., 2010), which is democratizing the field of innovation and entrepreneurship and enabling “Democratization of Consumption” (briefly DoC) or “Abundance” for the humanity (Diamandis et al., 2016); leading to a phenomenon, named as “Democratizing Innovation” (DI) (von Hippel, 2005), with significant consequences for Systems of Innovation (SI) and neglected by the majority of SI models. Accordingly, this research differs from the previous studies as it examines, how megatrends impact the Quintuple Helix, which emphasises ‘natural environments of society’ perspective (Carayannis, 2012), there is a need for a new model referred as “Democratisation of Innovation Systems” (DoIS) by integrating SI and DI in the light of the new findings (Warnke et al., 2016) by covering business (e.g. Circular Innovation (Lieder, 2016)), technological (e.g. Blockchain (Tapscott, 2016)) and economic (e.g. Democratized Entrepreneurship (Chen, 2017)) perspectives.

Considering the gap in the literature, this study uses the systematic mapping method (as used by Petersen et al., 2008 and Kitchenham, 2004)) to explore all relevant literature related to DI and SI, particularly of key contributors, and to finally integrate both for the new conceptual model of DoIS. The study has four generic stages; 1) SI related studies are examined to identify the most comprehensive and contemporary models, 2) DoC related studies are examined to identify new elements to be integrated into the existing SI models, 3) DI related studies are examined and 4) SI, DoC and DI related literature and models integrated at the final stage. In total, nearly 120 studies are selected from scientific databases using search terms and also based on the exclusion criteria using titles, abstracts and quality metrics. During the data extraction and mapping process all selected literature examined in-depth focusing on existing models and new elements to generate the new DoIS model.

Important findings, in addition to Quintuple Helix (Carayannis, 2012), are in summary, that DoIS, caused by megatrends, explained by technological laws related to “Data” (Moore, 2006), “Infrastructure” (Zhang, 2015) and “Energy” (Kardashev, 1964), will lead to emergence of new SI actors, along with new class of relationships and regulations, such as new group of organisations (i.e. decentralized autonomous organization; smart objects (Swan, 2015); bots (de la Rosa, 2017)); MOOC’s (Tapscott et al., 2017)), new group of citizen (i.e. “Do-It-Yourself” innovators, makers (Diamandis, 2012)), new group of capital providers (i.e. philanthropists, VC’s (Achleitner, 2007), crowds (Kuppuswamy, 2018)). These new types of interactions appear to minimize the dominance of central actors and increase the inclusiveness of the vertical and horizontal relationships between existing actors and new elements which are introduced in the new DoIS model.
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Triple-Helix Collaboration on the example of the Cultural Project the Golden Ring of Siberia

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Abstract: The paper is to study a tour itinerary The Golden Ring of Siberia as a cultural and educational project and a tool to stimulate local economic development. The key goal is creation of a unified tour around the regions of the Siberian Federal District through the popularization of the achievements of outstanding Siberian travelers. Today, a huge number of young people "live" on the Internet. In a variety of diverse and contradictory information, it is difficult for a young person to give an objective assessment of the real world, and form life values. The social importance of the project includes improvement of the level of geographical education of students and schoolchildren. The project is aimed at the personal development of the younger generation by increasing the motivation for cultural and educational tourism in Siberia and formation of youth fundraising skills for the implementation of non-commercial projects in the field of tourism by the institutions of civil society. Foreign students get to know Siberia as a beautiful, original and touristically attractive area of the Russian Federation. Within the framework of the project transport and logistic capabilities of the region and most significant touristic objects are being analyzed. Suitable marketing strategies and joint-cooperation opportunities are being investigated. The project was initiated by the Development Commission of Tourism of the Russian Geographical Society and is being developed by the research team of National Research Tomsk State University. The project intends involvement of entrepreneurship at different stages of the development, and emerges a typical scheme of Triple-Helix collaboration

Keywords: Golden Ring of Siberia, cultural tourism, tourism business, triple-helix collaboration, education program
Triple Helix in Cultural Inheritance and Talents Cultivation in Chinese Ethnic Minority Regions

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Abstract: This paper aims to present how Triple Helix theory could serve the cultivation of cultural inheritance talents in Chinese ethnic minority regions. Three cases are chosen-Baoshan gem-jade processing industry in Yunnan Province, Pengshui Miao nationality’s cultural tourism industry in Chongqing Municipality and Hetian Wei nationality’s pharmaceutical industry in Xinjiang Province. This paper discusses how these ethnic minority regions effectively connect different aims from distinctive industries with minority characters, higher vocational schools in ethnic minority regions and local social and economic development. It was found that through the common targets of the cultivation of talents and the inheritance of ethnic cultures, ethnic minority regions could gain more professional talents in ethnical cultural inheritance and local development; local industries with ethnic characters are provided with more oriented talents in products and governance; local higher vocational schools could get more stable amounts of students and students have more advantages in employment and entrepreneurship. This is a mode that all three parties could benefit from. Therefore, Triple Helix mode is a new and effective mode for Chinese ethnic minority regions to inherit their unique ethnic cultures and cultivate talents who are especially qualified and wanted in these regions. Further research would focus on whether Triple Helix theory could be applied to more Chinese ethnic minority regions.

Keywords: Chinese ethnic minority regions, cultural inheritance, talents cultivation
Has the tide turned towards responsible metrics for research?

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Across the research community, there has been an explosion in the range and reach of metrics to capture research qualities and impacts, and to benchmark institutional or individual performance. Citations, H-indices, journal impact factors, grant income and altmetrics now play a growing role in research management. In future, granular data on research is likely to be combined with more sophisticated metrics for impact, teaching and learning, to give planners and policymakers access to an unprecedented wealth of real-time analytics. In parallel with these developments, debates have intensified about the pitfalls and perverse effects of inappropriate uses of metrics, as reflected in initiatives such as the San Francisco Declaration on Research Assessment (DORA), the Leiden Manifesto and the Metric Tide (a UK government review of the use of metrics in research assessment). New institutional arrangements have also been out in place to address these concerns, such as the European Commission’s Open Science Policy Platform and the UK’s Forum for Responsible Research Metrics. In this talk, three years on from the Metric Tide review (which he chaired), James Wilsdon will review progress on the road to more responsible metrics.
Demand heterogeneity, decomposability and the coordination of innovation in multi-unit health organizations

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Keywords: service innovation, healthcare, NK model

A key question for multi-unit health organizations is how to coordinate innovative activity across their business units. An extensive literature exists on structural ambidexterity (cf. March, 1991; Benner and Tushman, 2003; Gibson and Birkinshaw, 2004). The general recommendation is that business units operating in different industry sectors should be structurally independent in order to allow innovative activity appropriate for its particular industry and its stage of the innovation life cycle. While existing research has compared bottom-up entrepreneurial and top-down managerial ways of organizing service innovation (Sørensen et al., 2013), there exists relatively little discussion about how a multi-unit organization, operating within one industrial sector, should organize its innovation. One way is to allow each unit to develop solutions autonomously. A key advantage is that local solutions can be tailored to the needs of each unit. Directed (top-down) innovation is an alternative means of organizing activities within a multi-unit organization. Here R&D is conducted by one unit and the new product/service is subsequently rolled-out to all other units.

In this paper, we present a third strategy – partition strategy. Here the innovation problem is broken down into a number of elements. The partition strategy has not previously been considered by authors within the literature on innovation within multi-unit organizations that operate in the same service/product market.

The paper analyses these three strategies through a computational model of multi-unit organizational search. We find that the efficacy of each search strategy depends on (a) the degree of heterogeneity of customer preferences faced by business units, and (b) the decomposability of the innovation problem.
The art of herding cats - governing smart specialisation strategies in four European Vanguard regions

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Research and innovation governance encompasses not only the policies and institutional frameworks, but also the interplay between various actors that together determine the priorities, strategies, activities and outcomes in research and innovation. In short, innovation governance requires a collaborative approach – leveraging the competencies and resources of various actor groups and facilitating systemic action.

With the rise of the concept of RIS3 (research and innovation strategies for smart specialization), regions across Europe have an increased focus on innovation governance and systemic leadership. They are looking to adapt their current structures and practices in ways that help them to more effectively define relevant focus areas and a clear strategic direction, to engage stakeholders and facilitate systemic action, and to foster dynamism and agility over time. Yet it is difficult to know what governance approaches are most effective – or even what alternative approaches could be – in order to pool efforts towards common strategic aims. What is the best way to herd cats?

The aim of this paper is to improve understanding and enable peer learning between regions on ‘the art of herding cats’ – i.e. systemic leadership and governance of regional innovation strategies. Through the use of a framework of structural characteristics and working practices, the paper describes and compares four cases with alternative approaches to innovation governance in Vanguard regions of Europe. The analysis results in a set of six distinguishing features that enable regions to more easily compare and learn from each other – gaining inspiration and helping them to identify areas for improving their approaches to innovation governance.

Keywords: systemic leadership, innovation governance, smart specialisation
Service innovations play a more important role in stimulating economic growth than before as service sectors dominate the major part of national output in many developed economics. Meanwhile, more and more scholars adopt the synthesis approach, instead of either demarcation or assimilation one, for investigating service innovations (Miles, 2008). That means some characteristics of service innovations should be different from those of manufacturer-based innovations. Similar rationale could be raised that some characteristics of triple helix collaboration for service innovations would be different from those of triple helix collaboration for manufacturer-based innovations. However, very few literatures have addressed the former subject. (It is believed that both theories of triple helix collaboration and national innovation systems are rooted mainly from the manufacturer-based innovations.) As a result, this study aims to explore how the triple helix collaborative research projects are initiated and implemented. Meanwhile, some service innovation policies would also be drawn from the study. The investigation is based on an ever-largest triple helix collaborative research project in Taiwan, with participants from government agencies, research institutes, universities, and industrial firms. The outcome of the study might provide with the potential pathway towards remodeling the framework of national innovation system.

Keywords: Triple helix, service innovation, service innovation policy
Collaborative governance as way-out for new economic challenges: an empirical study of China's e-commerce regulation

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New economic progress like e-commerce brings both opportunities and challenges to triple helix: university, government and industry. Besides tremendous profits to business, technologic evolution to academy and great progress to social development, they shade the toughest burden to governance ever before. On the one hand, potential complaint risks like privacy protection, fraud, jurisdiction disputes forced the necessity of preliminary governance, while on the other hand, for the lack of trip helix cooperation, knowledge and bureaucracy in traditional governmental managerial modes, policy making, implementation and enforcement in the emerging challenges pace backward. This article intends to fill this gap with a new form of governance, collaborative governance, which brings knowledgeable and qualified stakeholders in collective forums with public authorities to engage in new economic governance, but to some extent. In order to concretise the problem, we conduct the case study of China's B-C e-commerce regulation on customer rights protection. By studying the two-layer governance mechanism, industrial self-governance and public governance, within Chinese e-commerce context, the author explores the possibilities of collaborative governance, the intermediary role of university in cooperation, conflict and red line, framework design of collaborative governance and risk control on collaboration. The research find that collaborative governance strategy involving triple helix is an effective way-out for managing new emerging technology-oriented industries. However, balancing between autonomy and paternalism shouldn't be ignored. The article concludes with a discussion of implications of the collaborative governance strategy that dominant companies, which is normal in new technologies, speak for the industry for policymakers and for the future research.

key words: collaborative governance, new economy, e-commerce, trip helix.
Robotic Bureaucracy: An Assessment of Burden Shift in University Research Administration Through Email Analysis

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Keywords: Email Analysis, University Research Administration Burden

The expansion of university research regulations in the US has raised concerns about the cost and time burdens these regulations place on government funded university researchers (National Science Board, 2014). Into this conundrum has emerged the private sector, which provides software systems to automate university research grants administration including through automating sending of emails for reporting and compliance purposes to facilitate the ability of university researchers to comply with these government regulations. These systems, as much of information and communication technologies purport to do, are designed to enhance productivity, but, for whom? This paper examines the extent to which these systems result in a productivity paradox, producing a computer-enabled administrative burden shift to researchers. We employ a novel methodology based on a pilot analyses of emails associated with a small grant received by the authors, including emails generated by the software system – which we term robotic emails – as well as those sent by human administrators, to examine the research administration burden topic. We explore the extent to which the systems, through their emails, can serve as an indicator of the transfer of administrative tasks to faculty to a greater extent than personally sent emails and if so, in which administrative areas this transfer occurs. The results demonstrate that two-thirds of the emails sent upon project initiation are either robotic emails or emails that are needed to address issues raised by robotic emails. Moreover, this use of robotic emails is most prevalent in compliance and reporting areas and less involved with project initiation. Although this is a pilot study, it offers insights for similar studies in other domains of policy and administration about the use of data from systematized compliance requests or other mechanized administration technologies as a window into how these technologies may affect administrative burden.

Small-firm cooperation policies: when the triple helix meets the relational view

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Due to the horizontal nature of cooperation between small firms, the creation of cooperative endeavours is generally led by the intervention of external agents. The literature identifies the State as an important agent in this sense, but leaves gaps as to the ways of conducing policies with effective impact on fostering cooperation. The complexity of interorganizational relations draws a challenge to governments’ intentions to support the development of the whole diversity of organizations, especially small-firms. As a response, governmental entities seek to build partnerships that might extend the ability to act. We analyse in this study the capacity of governments to connect universities and industry to leverage public policy implementation. We recall the relational view as a lens of analysis to unfold the relational elements that enable a governmental entity to effectively fulfil its strategic goals. Then, we conduct a case study about a partnership among government and universities to implement the most fruitful public policy in Brazil to develop cooperation among small firms. The Cooperation Networks Program was responsible for the formation of 326 small-firm networks among over five thousand small firms from 2000 to 2015. As a Triple Helix phenomenon, the outcomes are a result of enduring interaction among the State Government, community universities and small-firms, each responding to a specific role in the public policy implementation. The case analysis brings implications to literature in two ways: a) it demonstrates that specific relational rents – per se access to community and spreadability – leverages the implementation of public policies; and b) it reveals that even when all determinants to relational rents are observed, the partnership does not return only into benefits but also into limitations. Notwithstanding, this paper brings practical implications as it informs public managers with best practices of a government-university partnership.

Keywords – Triple Helix; Public Policy; Small-firm Networks; Relational View
Understanding the use of industrial designs in Three ASEAN countries

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Compared to other forms of Intellectual Property our knowledge about economic value of Industrial Designs (IDs) is very limited. One of the main obstacles is lack of empirical data. At its core, this study conducts a survey of ID applicants to better understand why they seek this form of protection, how ID rights contribute to the appropriation of investments in design innovation, and what challenges applicants face when using ID rights. Specifically, this survey of ID applicants is carried out, with a view to obtaining insights into inter alia the following questions:

- What are the key characteristics of ID applicants, including their types of innovative activities?
- What motivates firms to apply for ID rights?
- What is the value of individual IDs?
- How do IDs fit into firms’ overall business models?
- To what extent are ID rights exploited internationally?
- Are IDs subject to disputes?
- What institutional challenges do applicants face when using the ID system?

Moreover, it aims to provide a better understanding of the role IDs play in business strategies in the middle-income countries. Countries do not need to be at the cutting edge of technology to come up with creative designs. IDs, therefore, can reflect a chunk of innovations that are not captured by patents. This project is to our knowledge the first attempt to gather original data to shed light on various aspects of ID that can be useful not only for users (applicants) of ID but also for policymakers. Finally, it aims to open avenues for further academic research on this topic.

Keywords: Intellectual property, Innovation, Emerging market
Open Innovation and Academic Research: The Case of Citizen Science Platforms

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The process of scientific knowledge production and dissemination is going through deep transformations due to the highly transformative digital innovations. The paper focuses on the phenomenon of active participation in scientific research of the academic community outsiders. The fast-growing number of crowdsourced academic research projects brings to the spotlights the citizen science platforms. Through a multiple case study approach, firstly, we portray the new configurations of academic research in the context of crowdsourcing platforms. Secondly, we investigate the functionalities of citizen science platform. Finally, we analyze the interactions among the platform’s features, functionalities and strategies. The paper extends the theories of open innovation and digital platforms to the academic research ecosystem.

Key words: citizen science platforms, open science; digitalization of academic research; digital platforms, citizen science platforms.
University Managers’ and Researchers’ Drivers on the Initiation of University-Industry Collaborations in Emerging Economies

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The pace of development is extremely high in emerging economies (EE), especially in Asia. This rapid development leads to an increased demand for new knowledge to achieve sustainable competitive advantage. In an innovation based economy, universities are key producers of new original knowledge and thus, universities can become an important external source of knowledge for companies in EE. Governments in EE develop initiatives to motivate companies and universities to collaborate. At universities, these collaborations are initiated on a faculty and managerial level. The researchers’ and managers’ drivers in initiating UIC are well studied in the European and US literature, yet more empirical research on these drivers in an EE context is needed. We address the following research question: “What are the university managers’ and researchers’ drivers to initiate university-industry collaborations in emerging economies?” We start from the existing literature on drivers of university managers and researchers to initiate UIC and build hypotheses on these drivers’ relevance in the context of EE. To answer our research question, we conduct a questionnaire among researchers at three Vietnamese universities. To complement our data, we conduct face-to-face interviews with managers of these Vietnamese universities. We compare both perspectives and identify similarities and differences in both researchers’ and managers’ drivers. This paper extends the existing literature on UIC in EE. Based on our findings, university management can review their reward and motivation system. Governments in EE can adapt their policies and initiatives to promote initiation of UIC at the universities by understanding what drives the different stakeholders within universities. Companies can use our findings to customize their communication and collaboration strategies with universities.

Keywords: university-industry collaboration, managers’ drivers, researchers’ drivers, emerging economies, Vietnam
Poster abstracts
Implications for practice of triple/quadruple helix collaborative work - Identifying factors for commercialization, scalability and diffusion

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Triple helix has been used as an effective concept capturing macro-oriented dynamics in the overlap between research, industry and government. It is within these overlaps we find collaborative partnerships taking the form of innovation clusters, with the aim to commercialize, spread and scale the outcome of conducted projects. However, the absence and need for more micro-oriented implications for practice is evident. As triple helix collaborations are becoming prevalent in practice, it is necessary to develop practical methods for both management and their effectiveness in terms of output and successful continuation of collaborative work. How can triple helix projects be managed effectively? Is it distinguished from other project management implications? How triple helix constellations are managed in practice and particularly the resulting outcomes from such collaborative work are not yet well understood.

The aim of this paper is to contribute to increased operationalization of triple/quadruple helix project management by synthesizing a framework/toolbox tailored to this context. By studying, categorizing and evaluating over 50 sustainability-oriented projects conducted by a triple/quadruple helix coordinator in Sweden, a set of factors will be extracted that generate (or constrain) commercial opportunities, scalability and effective dissemination of the conducted projects. The identified factors will be compared with previously written literature within the area and complemented with interviews with project managers of the studied projects in order to map project management mechanisms and/or principles that correspond to each defined factor. The expected outcome will be a synthesized working method in the form of a framework/toolbox specifically designed for triple/quadruple helix projects, with specific attention to the correlation between management mechanisms and success factors in order to improve commercialization, scalability and dissemination.

Keywords:
Triple/Quadruple Helix, Sustainability-Oriented Innovation, Scalability, Commercialization, Diffusion, Project Management
Obstacles to eco-innovation in Manaus Free Zone (Brazil) under the perspective of triple helix

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Innovation in Brazil faces numerous difficulties to develop. The objective of this research was to understand the reasons for the low innovativeness of Brazilian companies. The context of the companies of the Manaus Free Trade Zone was analyzed through a qualitative approach. Sixteen institutions were interviewed, including companies, government agencies, universities and research institutes. The results are based on the content analysis of interviews. The most relevant difficulties and obstacles are related to the disarticulation between the main actors of the innovation process - companies, academia and government agencies. Problems of economic and managerial nature and cultural, operational and political reasons are other important obstacles to innovation. The disarticulation between companies, government and public agencies is a consequence of the lack of a structured innovation system and a consolidated innovation model. Possible solutions for the development of innovations were proposed by the interviewees. These solutions are related to integrative political actions, planning, debureaucratization, qualification of human resources, among others.

Key-words: innovation, eco-innovation, obstacles to innovation, Brazil, Manaus Free Trade Zone
Regional innovation systems and its importance for the absorptive capacity of spin-offs academic origin

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Isand study aims to shed light à Need to deepen study of regional innovation systems and their importance in evaluating the innovative potential of Spin-Offs academic origin in Brazil. Regional innovation system is a group formed by public and private agents that interact in a specific territory, using its own infrastructure to broaden and share knowledge and innovation (YAM et Al., 2011). In a regional innovation system as a way of broadening the potential for innovation, Spin-offs Of academic origin need to have the ability to recognize external knowledge and use it in organizational learning, complementing with the approximation of companies that are part of the network (GALEN and FUENTE, 2003). A cApace aBsortiva It is a construct that It considers the flow of information, that is, the communication structure between the external environment and the Organization, which consists in adding new knowledge to the pre-existing and turning it into new knowledge (ZAHRA; GEORGE, 2002; TODOROVA; DURISIN, 2007). The study of Etzkowitz (2004) Concerning The "Entrepreneurial University" changed the role of the university within the national or regional economic context. After conceptualizing regional system of innovation and capacity Absortiva Be Established from Of the elements contained in the regional innovation systems, which are; Regional innovation Initiatives, KIBSs and information value chains, the Influence about the absorptive capacity of Spin-offs academic origin and consequently its innovative potential, through the relationship between the dimensions of absorptive capacity, which are: acquisition, assimilation, transformation and exploitation of knowledge. Few studies have considered the three elements of the regional innovation system, and his InfluenceAbout the absorptive capacity of academic background spin-off.
Improving access to health services for the Deaf through community engagement and design thinking.

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Universities are endeavouring to make their knowledge production more democratic and inclusive by engaging with civil society. We use the design thinking methodology to engage community partners at critical points in the innovation process, creating more inclusive solutions to health problems. Design thinking evaluates ideas by passing them through three lenses namely; user desirability, technical feasibility and business viability. To create truly human-centred innovations, we prioritise user desirability to ensure the unmet needs of the user are addressed. Design thinking relies on the user or community partner to give critical feedback to the ideas being developed, ensuring that the ideas are grounded in true and lived experiences. As an illustrative case study, we present a project aimed at improving the healthcare experience of the deaf community by expanding the access of deaf patients to the Ophthalmology Clinic at a public hospital. The concept of a video calling interpretation service for deaf people was developed to provide increased access to registered interpreters through mobile telecommunications technology. Lack of access to interpreters affects the level of care that deaf patients receive as interpreters create a more productive and inclusive experience. Through a mobile application, deaf users would be able to access available interpreters from various geographical locations. In our developing-country context, the cost of mobile connectivity is a barrier to implementation; thus cooperation between clinical facilities and mobile service providers should be explored. Design thinking provides a way of addressing the needs of communities by including their voice in the design of health-related innovations. There is direct engagement by means of interviews and/or immersive practices, leading to a deeper understanding of the context of the problem. We foreground social inclusion and engagement with end users in our innovation pathway as these are key to the design of solutions that suit user needs.
A reference model for technology parks management using Balanced Scorecard (BSC)

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Technology parks have spread throughout the world as mechanisms to promote innovation, technology transfer, knowledge exchange, generation of skilled employment and socioeconomic development. Nevertheless, a current challenge for these ventures is the development of more detailed performance and management systems, representing the major stakeholders (government, universities and companies). Although proposals have emerged in recent years, there is no consensus on what a successful technology park and it is particularly difficult to properly compare these ventures. To contribute to fulfill this gap, this work proposes a theoretical model for a reference model for technology parks management using Balanced Scorecard (BSC). Thus, a strategic map of science parks was prepared, integrated with a set of theoretical and conceptual performance indicators, based on successful technology parks factors. In drawing up this model, the theoretical approach was complemented by an exploratory and qualitative study with three Brazilian technology parks in operation and two science (research) park in the USA. The justification for the development of this model, which obviously does not include all the features and parks typologies, is the need for the creation and improvement of a management tool that is a reference for technology parks’ managers and stakeholders. Thereby, it is expected that the model helps in understanding the strategic goals and performance indicators common to these ventures. Despite the limitations of the research, it is believed that this work can support the establishment of strategic management systems that will contribute to technology parks’ development.

Keywords: Technology Parks, Critical Success Factors, Performance Management, Balanced Scorecard.
University Scientists as Entrepreneurs - Enhancing the Intention for New Venture Creation through Industrial Collaboration

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Research aim and relevance

The study addresses the following research question: How do scientists’ industrial collaboration affect their intention to create new ventures? Academic entrepreneurship deals with the question how scientists and universities identify and exploit opportunities to commercialize intellectual property through entrepreneurial activities such as the creation of spin-offs and start-ups (Shane 2004; Perkmann et al. 2013; Haller and Welch 2014; Kiani Mavi 2014; Siegel and Wright 2015, 2015). Extant research has shown, scientists play an important role in fostering entrepreneurial activities (Jain et al. 2009; Goethner et al. 2012; Kalar and Antoncic 2015; Halilem et al. 2017). However, research about the spillover effects from scientists’ industrial collaboration on their intentions for new venture creation remains scarce (Grimaldi et al. 2011; Siegel and Wright 2015). Our study addresses this research gap by empirically testing a research model, which proposes that scientists’ industrial collaboration enhance their intention for new venture creation.

Methods

To examine the proposed relationship we draw on a dataset of 1,400 German university scientists. We applied an online survey and targeted scientists in departments with high relevance of industrial collaboration. We used established constructs and conducted hierarchical regression analysis. We conducted different reliability and validity tests for self-reported data.

Findings

We found that industrial collaboration of university scientists have a significant impact on their intention for new venture creation. Our results provide conclusive support for the assumption of spillover effects from scientists’ industrial collaboration on their intention for new venture creation.

Implications

Understanding how scientists intend to create a new venture is an important step towards answering to what extent university scientists are a potential resource for the new venture creation process. If university policy makers are able to assess such intentions, appropriate structures and strategies could be established to encourage scientists to become academic entrepreneurs.

Keywords: New venture creation; university scientists; industrial collaboration; academic entrepreneurship
References


Kazakhstani Universities as Innovation Drivers

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The problem of creating a favourable innovation climate is relevant in the CIS countries. In Kazakhstan, the Soviet innovation system in the form of Academic Institutes - Scientific and Production Associations - Industrial enterprises no longer exist, and the question of the development of the university system, enhancing its research and production capabilities. In the present work, the experience of one of the leading state technical universities of Kazakhstan - the Kazakh National Technical University after K.I.Satpaev (KazNRTU). All university departments and companies at the university are divided into three categories of units: education, science and production. There are at least two separate units to support the commercialization process - the Technopark and the Commercialization Office. Experience in the development of innovative activities in KazNRTU shows the following. At us often the divisions responsible for the development of innovative activity, unite in itself all these elements, acting before them as the higher organization. Therefore, it is quite natural that it is difficult for such a subdivision of the university to build trust relations with researchers. Consequently, the university is approaching the market model, although there are also signs of a command-administrative model. It's too early to speak about the model of the triple helix.

Keywords: innovations, university, science, production, education
Entrepreneurial University Index: how the Triple Helix can promote Universities as local socioeconomic engines

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The Brazilian Entrepreneurial Universities Index was launched in the Ministry of Education in 2016, with a second version in 2017. The index of 2017 analyses 55 universities and gathers Brazilian and international case studies to encourage the spread and replication of good practice through academic leadership and public policy. A mapping was undertaken of the variables that influence a university entrepreneurial ecosystem. Research was carried out to discover the student perspective and understand the factors to which they regard a university as entrepreneurial. The study obtained over 10,000 responses. Student ambassadors also collected other institutional data. A core conceptualization was that an entrepreneurial university is an academic community, inserted into a favorable ecosystem that develops society through innovative practices. Key factors and indicators were chosen by the students as most influential in making a university more entrepreneurial. These factors included: (1) Entrepreneurial culture: student entrepreneurial stance; academic staff entrepreneurial stance; curricular grade evaluation; (2) Extension: networks, e.g. Junior Enterprise/ AIESEC/ Enactus/ Rede CsF / others; extension projects; (3) Innovation: research; patents granted; proximity heiprivate sector (incubators); (4) Infrastructure: quality; technology parks; (5) Internationalisation: exchange and study abroad; collaborations with foreign universities; international research; and (6) Financial capital: budget; endowment. The study provides insight and guidance about how Brazilian universities can become more entrepreneurial, generating healthy interfaces between the Triple Helix (universities, industry, and government) and other sectors to promote economic and social development. The organizations leading this process have generated debate about the findings in Brazil, and aim to scale this project to a global level.


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Keywords: entrepreneurial universities; index
Comparison of the Triple Helix elements in the National Innovation Systems of China and Russia

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Keywords: Russia, China, national innovation system, entrepreneurial university

A rapid innovative race and changing realities of the economic environment complicates the development of national innovation systems (NIS) in countries with developing economies. Their governments face the task of implementing innovative models that ensure the transition of NIS into a self-developing state. Today, the Triple Helix Model (TH model) of innovative systems organization has acquired a special scientific and practical interest. The purpose of the report was to obtain evidence, on the example of China and Russia, on the feasibility of implementing the TH model elements in transition economies with fast-growing markets.

Systematization of a large amount of information benefited to confirmation that both China and Russia successfully implement the TH model elements in their NIS. China has been successfully transforming high school into an entrepreneurial form for 20 years. By 2010, 88 universities in the country received and confirmed the status of the EU. A localized "knowledge space" has been formed around each of them, practically applied in the form of Science parks. The paper presents evidence of a phased "twisting" of the innovative spiral in Zhongguancun.

In Russia, the process of the EU evolvement is at the initial stage. The EU cluster occupies a rather limited place in the system of Russian universities. But even such a small scale has an impact on the economic endogenous growth of the region where the high school is located. The evidence of this supposition is result of the research that showed the success of the EU in the Siberian region.

Analysis of TH model elements formation in the NIS of China and Russia made it possible to identify the main problems that prevented to vanquish the focal character of their development. The paper presents the strategic steps, the adoption of which will allow scaling the implementation of the TH model.
Academic Scientists and their practices in the technology planning for academic spin-offs

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The entrepreneurial university has given new goals to academic research groups and laboratories switching from a unilateral search for knowledge to a multiple objectives such as advanced knowledge, human capital, and high-tech enterprises (Etzkowitz, 2013). In this context, the leaders of laboratories and research groups are not limited to the search of knowledge, but must manage these environments as companies, prospecting, planning, developing and transferring knowledge into products to society.

According to Wright and Phan (2018), it is necessary to consider new aspects for the study on academic entrepreneurship. It is assumed that a more in-depth analysis of the procedural level of research and science is essential to understand the importance of the role that scientists play in the effectiveness of university-level policies in relation to the commercialization of science. According to the authors, micro level considerations such as daily activities, behaviors and motivations may influence scientists to engage in entrepreneurship, although this is not a natural consequence of their academic background.

Regarding the technological spin-offs development, one of the aspects of micro level is technology planning. This concept is well established inside large companies but there is no definition of what this might mean for academic spin-offs, as well as what practices are best suited for this context.

The objective of this research is to develop a construct for innovation planning to support spin-offs and a survey of best practices used by experienced researchers in Brazil and Canada.

First, we seek the concept of a technological plan to understand the practices used in the planning and management of technology. These findings are the first steps in the search for a theory that can support academic researchers in innovation planning, in order to increase the possibility of success.

Keywords: (academic scientist, entrepreneurial university, research group, academic spin-off)
University strategies for increased collaboration: A case study of the Science Faculty, University of Copenhagen

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Strategic planning has become increasingly integral to university operations in recent decades with nearly all European universities developing each their own university strategy. As the landscape of higher education is changing and universities’ role extends beyond conducting research and educating, university leaders address organizational changes by formalizing strategic processes and setting institutional directions and while the subject of the university has been a of interest to scholars in multiple disciplines such as entrepreneurship, innovation management, policy and economics, strategic management issues confronting the universities have not been fully addressed. By employing case study research approach and strategic management concepts, such as organizational capabilities and organizational change management, this study aims to examine the role of university strategy for addressing key issues related to managing collaboration with external partners at the Faculty of Science at the University of Copenhagen (Denmark’s largest natural science research and education institute). The increasing demand from university to utilize the knowledge from research and teaching in order to address growing societal and economic challenges by fulfilling their “Third mission” have resulted in a strategy for extended cooperation with public and private enterprises. Although there is an extensive body in research on university-industry collaborations in terms of technology transfer and academic entrepreneurship, we know little about how collaborations are affected by the university strategy. This study aims to shed greater light on the role of strategic management for shaping the organizational conditions of knowledge exchange between university academics and private organizations.

Keywords: university strategy, organizational capabilities, change management, collaborations
Innovative activity in state universities of Kazakhstan

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The problem of creating a favourable innovation climate is relevant in the CIS countries. In Kazakhstan, the Soviet innovation system in the form of Academic Institutes - Scientific and Production Associations - Industrial enterprises no longer exist, and the question of the development of the university system, enhancing its research and production capabilities. In the present work, the experience of one of the leading state technical universities of Kazakhstan - the Kazakh National Technical University after K.I.Satpaev (KazNRTU). All university departments and companies at the university are divided into three categories of units: education, science and production. There are at least two separate units to support the commercialization process - the Technopark and the Commercialization Office. Experience in the development of innovative activities in KazNRTU shows the following. At us often the divisions responsible for the development of innovative activity, unite in itself all these elements, acting before them as the higher organization. Therefore, it is quite natural that it is difficult for such a subdivision of the university to build trust relations with researchers. Consequently, the university is approaching the market model, although there are also signs of a command-administrative model. It's too early to speak about the model of the triple helix.

Keywords: innovations, university, science, production, education
The philological refunctionalization of the Campania Region UNESCO sites according to the Quadruple Helix Model

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In Campania Region (Italy) there are unique cultural sites in the world, subject to four distinct UNESCO declarations. These are sites such as the excavations of Pompeii, Herculaneum, Stabia, the temples of Paestum, the Royal Palace of Caserta, the site of San Leucio, the Museum of Capodimonte and many others. All these cultural sites have a common origin: they were wanted by the Bourbon dynasty. The Bourbon sites have a further feature. Not all are born as sacred places destined for the Muses; many of them were born with a proto-industrial connotation.

They are: agricultural estates and hunting reserves, characterized by a high naturalistic value, production sites (such as royal factories for the production of tapestries, Capodimonte porcelain, silks), sites with a high cultural value (such as Excavations of Pompeii, Herculaneum and Stabia, National Archaeological Museum, Temples of Paestum, Gallery of Capodimonte), sites with a high social value (Royal Palace for Poors), sites for local government (Royal Palace of Caserta).

Through a long historical research work it has been shown how these sites are the expression of a specific project of territorial government that must be updated according to the principles of the Quadruple Helix, in order to obtain their philological refunctionalization. All these sites can become much more than they are today, that is only museums. They are originally vocationed to be places of physical meeting between the various actors of the Quadruple Helix Model (Public Administration, Industry, Academia, Civil Society), each according to the economic sector of reference, where build all together a socially responsible innovation.
The Impact of Self-Evaluation on Burnout: The Surprising Role of Effectuation

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Already in 1974, Freudenberger remarked that those, dedicated and motivated to something, are more likely to experience burnout (Freudenberger, 1974). This very much accounts for entrepreneurs, who, while dealing with countless challenges along the path to profitability, are likely to forget to focus on their own psychological well-being (Perry, Penney, & Witt, 2008). Therefore, the lack of research on entrepreneurial burnout is particularly surprising (Lechat & Torrès, 2016; Shepherd, Marchisio, Morrish, Deacon, & Miles, 2010; Voltmer, Spahn, Schaarschmidt, & Kieschke, 2011) especially as the conducted empirical studies at this point are largely inconsistent (Lechat & Torrès, 2016).

We suggest that the deliberate use of effectuation, defined as the entrepreneurial decision making logic (Sarasvathy, 2001), can decrease the likelihood for entrepreneurial burnout significantly. By adding the consideration of individual personalities in the form of core self-evaluation, we directly respond to Lechat and Torres (2016) who propose that personality traits moderate the perception of events, thus the probability for burnout. Personalities of entrepreneurs are likely to affect, beyond perception, the way they cope with high levels of stress (Connors-Smith & Flachsbart, 2007). We propose that entrepreneurs who apply effectuation to cope with stress, thereby reduce their probability for burnout. This accounts especially for those who suffer poor core self-evaluation (Perry et al., 2008). The assumption is tested on survey data among German entrepreneurs in the first quarter of 2018. The entrepreneurs are approached through incubator programs, VCs and the start-up platform Crunchbase.

By analysing antecedents to burnout, this paper aims at examining how burnout can be leveraged. Effectuation is offered as a valuable approach to be translated into practice with the aim to control burnout-reduction interventions.

Keywords: Entrepreneurship, Maslach Burnout Inventory, Core Self-Evaluation

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In today's knowledge society, globalized and competitive, those companies capable of adapting to continuous changes and technological developments will be the ones capable of surviving and having a sustainable impact on the socio-economic development of the region in which they are located. For this reason, companies have to interact in an open manner with different agents that generate local and international knowledge, carrying out R & D projects that lead to innovations through which they acquire a competitive advantage. The university, as an entity that conforms to the model of Quadruple Helix and in process of transformation towards the so-called 'Civic University', seeks and contributes to business excellence as well as to the social well-being of its region.

In this context, Mondragon Unibertsitatea, thanks to its history and mission, is born with a social vocation, destined to fulfill the characteristics of a Civic University.

It currently has 4 faculties, 4,534 students and 562 staff, and maintains stable relationships for the development of the dual training of its students, final and master projects, as well as research and transfer activity, with more than 200 companies, which finance 50% of its research activity.

In addition, it is part of the Mondragon Corporation, a cooperative business group with 268 companies and more than 73,000 employees.

This research work focuses on the case of Mondragon Unibertsitatea, as this case study can lay down the foundations of the Civic University and highlight the role of the university in the Quadruple Helix model, demonstrating its impact on the competitive level of the businesses with which it collaborates as well as on the region. Thus, through the Case Study methodology, the positive influence of this cooperation will be analyzed, demonstrating the differences in social and economic results achieved by collaborating and non-collaborating companies.

Keywords: Civic University, University-Business Cooperation, Quadruple Helix, Business Competitiveness, Regional Socio-economic Development.
Design of A Virtual Network Organization for University-enterprise-government Cooperative Scientific Research Projects with University-dominant Type

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Abstract: With the coming era of knowledge economy and the emergence of the internet, innovation is increasingly based upon a ‘Triple Helix’ of university-government-industry interactions. The increased importance of knowledge and the role of the university in incubation of technology-based firms have given it a more prominent place in the institutional firmament. The structure of the triple helix model determines the combination of university, industry and government in this system, which reflects the system design of communication and cooperation among the three.

This paper examines cooperative research projects among universities, enterprises and government with triple helix model. It uses a practical project case to illustrate the design of a virtual network organization established for such cooperation. This is shown to be a university-dominant organization, and one of three possible types of virtual network organization design, which could take advantage of enterprise links, it was also supervised and funded by the government. Cooperative research projects can be organized in the planar type, the matrix type, and the three-dimensional type of virtual network organization. Then the paper discusses relevant design principles, and examines their application and its results in the case study. Finally, we discuss how the indicators were chosen and how they were assessed.

Therefore, this paper is not just an abstract analysis of what should be done in design, but actually includes a case study. It could be benefit for practical applications of triple helix model on the next steps and future research requirements, wider design and policy implications. Meanwhile, this approach could break the boundary barriers, extensive integration and utilization of social resources, and then produce the R&D innovation synergistic effect.

Keywords: University-dominant; University-enterprise-government Cooperative Research Project; Government Funding; Triple Helix Model; Organization Design; Virtual Network Organization.
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