Promoting university-business cooperation in developing countries: evidence from Central Asia

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Promoting University-Business Cooperation: Empirical Evidence from Central Asia

Key words

Innovation Systems · University-business cooperation · Triple Helix · Action Research

Abstract

Higher Education Institutions (HEIs) are increasingly recognising their role in promoting innovation. HEIs now see themselves, and are seen as, equal partners with business and government actors in a dynamic process. However, successful innovation and university-business cooperation (UBC) requires the creation of platforms dedicated to the generation and exploitation of innovation and realisation of value. Such platforms form a space that facilitates and encourages different actors to share capabilities to foster co-creation. They are based on building a shared institutional logic (routines, protocols etc.) which fosters a collaborative culture amongst key actors in the innovation ecosystem.

UBC is an accepted and expected feature of the higher education and innovation landscapes of developed countries, but has not yet become institutionalised or well understood in developing economies. This research was conducted in Central Asia (CA). CA HEI managers and academics do not always have sufficient experience and knowledge to design innovation platforms. Dynamic shared tools are needed to enable stakeholders to learn from each other and build a common pool of knowledge, resulting in decisions that are most valuable to an emergent innovation system**.**

The paper takes an instutional perspective based on a group of fourteen case studies of the design, development and implementation of new UBC intermediary agencies. The research methodology is one of action research as a major component of an EU-funded project with an overall aim of developing a model for UBC which learns from experience elsewhere but is firmly grounded in CA needs and the development of the regional economy. Few relevant studies have been undertaken in CA and exploring the fit betweeen the culture of CA economies and their HEIs is an important addition to our overall understanding of UBC. Whilst care needs to be exercised in generalizing findings from this context, there are useful lessons to be learned which have much wider application.

1. Introduction

University Business Cooperation (UBC) is understood to mean transactions between Higher Education Institutions (HEIs)[1] and business for mutual benefit. HEIs in developed countries have evolved from the basic functions of teaching and research, to embrace a third one based on commercialization of research in which partnership with industry is the most important element (Dan, 2013). Etzkowitz (1998) relates the internal changes within academia to a normative change in science equivalent to a academic revolution, whereby "the conflicts are no longer whether the university should pursue knowledge for profit, but over the shape that organizational innovations to accommodate industry connections will take" (p.831).

In recent times, UBC has been undergoing a transformation from the dyadic university-business relationship, aimed at solving firm problems or sourcing new products and providing an outlet for academic research, to a broader university-business-government relationship that incorporates new features, such as societal concerns for economic and social development at the national, regional and local levels, as well as greater responsiveness to firm and university needs (Etkowitz and Ranga, 2011). This transformation has generated a wealth of analytical approaches, notably the very well-known Triple Helix model (Etzkowitz, 2008) and its developments, including the quadruple helix (Galvão et al., 2017) and quintuple helix extensions (Carayannis et al., 2012). Successful cooperation of HEIs in synergetic relationships with governments and businesses is considered the ideal driver of knowledge-based economies and societies (Etzkowitz, 2008). By engaging HEIs in a coordinated and complementary symbiosis with government and businesses, it is argued that a knowledge economy can be cultivated and thus, regional economic development fostered (EC, 2011). Ultimately, such collaboration initiatives can increase generation of innovations and ventures and enable growth in societal wealth (Cavallini et al., 2016).

However, despite its importance in the theoretical framework describing UBC, the Triple Helix model has been criticised for its emphasis on developed economies and lack of inclusion of experiences from less developed economies (Williams and Woodson, 2012). Similarly, although many studies have been directed at understanding interactions between HEIs and business in the framework of developed economies, not much is known about UBC within the context of less developed economies. The consequences for their transition towards market-

[1] The term HEI is used in this paper synomously with the terms Academy and University.

based economies, and their integration into asymmetric globalized contexts can be difficult to capture within contemporary UBC models. The changing nature and quality of interactions between industry and universities, and the perceived role of universities in society and the economy are critical here; a much more integrated approach to UBC and the role of government as promoters of them is needed (Etzkowitz and Leydesdorff, 2000).

The purpose of this study is to contribute to the debate on how best to design and implement UBC initiatives in less developed economies. The study focuses on the operational level of two Triple Helix actors, HEIs and business, with a particular focus on HEIs in CA. The argument for focusing on these two actors is that the role of government is more strategic than operational. This paper presents an extensive case study of a number of implemented UBC initiatives in CA universities located in Kazakhstan, Turkmenistan, Kyrgyzstan, Uzbekistan and Tajikistan. The intended outcome is to derive principles, grounded in a systematic analysis of the experience gained from delivering the INOCAST project ("Innovation Labs in Central Asia for a sustainable catalyzation of innovation in the Knowledge Triangle", co-funded by the EC TEMPUS program). The approach adopted is one of action research (Susman, 1983; Susman and Evered, 1978) with an aim of improving practice, rather than a deductive approach focused on testing particular schemes and types of UBC and specific hypotheses based on those.

Section 2 briefly discusses some of the recent literature on UBC. This is not intended to be a comprehensive review, but does highlight the most relevant theoretical perspectives against which our findings can usefully be seen. Section 3 focuses on the applied research and describes the methodology used. Section 4 introduces the diagnosis of the context while section 5 provides a discussion of key points of interest derived from the analysis. Section 6 sets out conclusions.

2. Theoretical background

Cooperation between universities and industry is becoming increasingly important, since it has the potential to create reciprocal benefits for all parties involved and society in general (Muscio, 2010). The theoretical framework describing UBC encompasses several bodies of literature, which reflects the complexity of the topic and the various perspectives from which it can be addressed. Arguably, the mainstream acknowledgment of the role of Universities in the innovation process and the impact of their interaction with business and government is the

Triple Helix model (as introduced by Etzkowitz and Leysdesdorff, 1995; 1998; Etzkowitz, 2003; and Inzelt, 2004).

The Triple Helix thesis is that the potential for innovation and economic development in a knowledge society lies in a more prominent role for universities and the hybridization of elements from university, industry and government combining to generate new institutional and social forms for the production, transfer and application of knowledge. In geometry, a triple helix is described as three congruent helices and this forms the basis for the usual visual representations of the Triple Helix model in innovation studies. However, outside of the ordered world of geometry, the helices are rarely, if ever, congruent; congruence implies a high degree of equality between the components of the triple helix structure. However, the key Triple Helix elements (governments-universities-businesses) are not often well integrated and that industry and academy tend to avoid involvement with government actors (Brännback et al., 2008).

Indeed, much analysis of the dynamics of helical models in economic development has focused on which strand or component is the driver. For example, the shift towards knowledge-based societies and economies in the developed world has given a stronger role to universities (Etzkowitz, 2003). This formulation is rooted in the concept of the "entrepreneurial university" as a key driver of in the transition from the industrial to the knowledge society. Universities have evolved towards an entrepreneurial role. This evolution gave rise to the concept of University-Business Cooperation (UBC), which, according to the report *The State of European University- Business Cooperation* (Davey et al., 2011) refers to "all types of direct and indirect, personal and non-personal interactions between HEIs and business for reciprocal and mutual benefit including: collaboration in R&D, personnel mobility (academics, students and business professionals), commercialisation of R&D results, curriculum development and delivery, LLL (Lifelong Learning), entrepreneurship and governance". As the definition suggests, UBC incorporates all levels of cooperation from personal relations between staff members to cooperation at an institutional level – anything that can generate benefit to the parties involved is considered UBC and, as needs to be emphasized in this cooperation model, the benefits are mutual and reciprocal. University-Business Cooperation is only successful if it operates on a quid pro quo basis, generating gains for all parties involved. UBC is an extensive area not only in terms of cooperation levels, but also in the various ways universities and businesses can cooperate.

The interaction among HEIs, companies and the governance system is also seen as a key factor for improving innovation conditions at regional level (Etzkowitz, 2002; Farinha and Ferreira, 2013; Alves et al., 2015; Gordon, 2016; Ranga et al., 2016). In the Triple Helix, regions are seen as clusters of economic actors rather than collections of autonomous entities, which happen to be co-located, pursuing their own agendas to the exclusion of all else. It is not solely the individual helices that are important, but the quality of the interactions across the bilateral pairings government to industry, government to universities and universities to industry. Put another way, a successful Triple Helix is dependent on the strength of its components (the individual helices), the quality and extent of the relationships between those components and the development of a set of activities (functions) which are specific to supporting the development of helix activities (Etzkowitz and Ranga, 2011). The strength of the Triple (or quadruple or quintuple) Helix is reliant on the strength of the common grounding in a shared base of physical, knowledge and cultural assets and the strength of ties between the components.

The Triple Helix view stresses the importance of knowledge as the key resource in developing sustainable competitive advantage. Firms possessing a high degree of technical knowledge have developed sophisticated skills in product and services design, optimisation of productionisation and improving functionality and reliability. Market knowledge is the guide which stimulates firms to apply their technical knowledge in profitable, customer-centric directions. As Lichtenthaler (2009) puts it, the role of market knowledge is to provide "insights into the functions that technological knowledge may fulfil…the knowledge that a firm actually explores, transforms, and exploits" in competitive activities. Technological and market knowledge, provided they are of high quality, taken together can enhance firms' innovation performance by promoting the ability to identify and fill market gaps and opportunities (Zahra et al., 2000). Knowledge quality is usually taken to have two dimensions, knowledge breadth, the range of relevant and potentially useful sources of knowledge the firm can access, and knowledge depth, the level of sophistication of that knowledge (De Luca and Atuahene-Gima, 2007).

Organisations need the dynamic capability to exploit opportunities and deploy resources effectively. Dynamic capability can usefully be disaggregated into three different capacities; sensing, seizing and transformational (reconfiguring). "Sensing (and shaping) new opportunities is very much a scanning, creation, learning, and interpretative activity" (Teece, 2007: 1322). Seizing is the ability to address opportunities through new processes, products,

services and business models. Transformational capacity relates to maintaining competitiveness through reconfiguring firm resources. Taken together these capacities enable organisations to find and exploit new value enhancing opportunities through asset orchestration (Helfat and Peteraf, 2009).

Overall there is a strong consensus on the broad dimensions of the role universities can, and are expected to, play in a knowledge-based economy (Unger and Polt, 2017). All approaches emphasise the development of an integrated and systemic set of interlinkages between universities, business and government with the aim of generating innovations. However, whilst the overarching dimensions of successful UBC relationships may be agreed, there is still a need to understand the dynamics of these relationships and the means and ways of establishing successful innovation structures are still far from understood and the success of initiatives far from given (Sandström and Ylinenpää, 2012). In particular, the development of "consensus space" is regarded as vital for the ongoing health of the linked knowledge and innovation spaces to which successful UBC strategies aspire (Etzkowitz and Ranga, 2011).

The research reported here adopts an institutional perspective and examines the potential roles of universities as innovation actors through a case study approach. The institutional perspective distinguishes between three main configurations. In a statist configuration government plays the lead role, driving academia and industry, but also limiting their capacity to develop initiatives. The laissez-faire configuration is characterised by limited state intervention in the economy, industry is the driving force, universities act mainly as providers of skilled human capital and governments as reluctant regulators. In a balanced configuration, proactive universities act in partnership with industry and government and often take the lead in joint initiatives (Etzkowitz and Leydesdorff, 2000). For most economies, a balanced configuration is likely to be the most positive. The notion of "balance" mirrors the three (symmetric) strands of the Triple Helix.

The paper is based on an analysis of evidence systematically collected over the life of an EU project which, itself, comprises fourteen instances of attempts to create university-instigated UBC intermediaries in different regional contexts. It depicts the key aspects of how to design sustainable and context centred schemes, acting as robust tools to foster university 'third mission' of commercialization of academic research and involvement in socio-economic development.

3. Research Methodology

A research design is the logic that links the data and evidence to be collected to the approaches deployed for analysing that data in order to advance our knowledge and understanding of the phenomena to be explored. This study follows the Action Research methodology suggested by Susman and Evered (1978). Action research embodies a reflective process of progressive problema-solving led by individuals working with others in teams to improve the way they address issues and solve problems. Here, the team comprised 14 CA HEIs that aimed to build a more effective environment to promote UBC. Each CA partner institution involved a mínimum of three senior staff on a continuous basis throughout the project life. Action research pursues action and research outcomes at the same time and embodies consultancy components aimed at promoting change elements as a form of field research. Action research is usually built up in a series of responsive and flexible cycles, it is deliberately emergent. The specific iterative process followed in this study correlate to the five phases of action research: (1) diagnosing, (2) action planning, (3) action taking, (4) evaluating, and (5) specifying learning. Although the detailed process below is notionally presented as a linear sequence, our approach is qualitative and cyclically reflective.

3.1 Diagnosing

The first phase includes identifying a real problem and the collection of theoretical data for a more detailed diagnosis. Empirical data was collected through 14 institutional surveys, and five country reports. The purpose of the institutional surveys and country reports was to identify a real problem and identify possible barriers (i.e. perceived blocks) that could help us to accelerate UBC initiatives. A further purpose was to investigate the role of UBC relationships in the specific context of Central Asia. The collected material was coded using Grounded Theory (Strauss and Corbin, 1990). The latter helped us to categorise barriers which were summarized as part of the problem addressed. The output from the diagnosing phase was a problem grounded in both practice and theory. An additional important output was the collection of material to support action planning. Section 4 discusses the outputs from the diagnosis phase.

3.2 Action Planning and Action Taking

In this phase, we initially created a benchmark study. The purpose of the benchmark study was to collect and analyse data on various forms of operationalized UBC initiatives as tentative solutions to the problem addressed. Such solutions include innovation labs, living labs (Pierson

and Lievens, 2005), and innovation science parks (Phan et al., 2005). To assure a solid understanding of the concepts, we studied existing UBC solutions in European countries. Finally, we visited innovation labs, living labs and science parks in England, Spain, and Sweden, to learn from the experiences of others who had successfully created UBC instances. Based on the outcomes of the diagnosis phase, practitioners and researchers jointly elaborated how UBC initiatives could be contextualized and ultimately presented as UBC strategies. In total, 14 contextualized UBC strategies were created (one for each participating CA University), each of them including specific solution objectives. Each strategy was discussed and evaluated by researchers and CA practitioners in collaboration and improvements were made. Finally, each CA participant formed implementation plans. Section 5 outlines these activities further.

3.3 Evaluation and Learning Specification

In this phase, we iteratively reflected on the resultof the prior phases in order to evaluate and specify the learning. More specifically, we evaluated the implemented UBC initiatives against the solution objectives identified. The purpose of the activity was to ensure that we had fulfilled the main and overall objective; to promote university and business collaboration in CA contexts. Finally, we formulated and presented the lessons learned as contrasting views of the world. Discussion of these views should facilitate the implementation of UBC initiatives for other actors in similar contexts.

4. Diagnosis: results

CA countries are geographically landlocked and economically isolated from the world's most dynamic and innovative centres. The World Bank characterised the region as being one of low density, long distances and many divisions (World Bank, 2008). CA countries still have transitional economies, weak democratic governance models and state control of major sectors (European Commission, 2015). Long term social issues, such as poverty, population and destructive means of land usage, have been joined by new ones, notably food security and the intrusion of religious extremism into many areas of life, including education.

Kazakhstan and Turkmenistan are highly dependent on oil and gas exports. Kyrgyzstan and Tajikistan have rich resources of gold, aluminium and other metals. The average share of services in GDP in CA (50 per cent) is well below the world average (70 per cent) and natural resources continue to make up the bulk of exports. Control over physical resources is the dominant driver of economic activity. In terms of the Global Economic Monitor (GEM)

classification, most CA economies are still at the factor-driven stage and heading into the efficiency-driven stage. Progress to the efficiency-driven stage and increased competitiveness is driven by efficient markets for goods, labour and capital, and harnessing the benefits that existing technologies can deliver. The innovation stage is still some distance away (WEF, 2017).

There have been few studies which have specifically investigated the role of UBC relationships in CA economies. Trushin and Carneiro's study of Uzbekistan for The World Bank underlined the importance of higher education to the economy, but not as a source of innovation. The role of universities was expressed as improving higher education and training; their proactive role in innovation or knowledge creation was not explored (Trushin and Carneiro, 2013). The recent UNCTAD study of Tajikistan argued that the promotion of innovation in the country should start by implementing a Triple Helix approach in order to realise the potential for synergies (UNCTAD, 2016). A number of specific recommendations amounting to first steps towards policy formulation were identified, including government providing incentives for universities to participate in collaborative projects and promote technology transfer. Public-private innovation centres and business incubators were also suggested. The largest and most economically advanced CA country, Kazakhstan, was studied by Musayevich et al. (2015). Their work applied the Triple Helix approach to assess the effectiveness of innovation policy. They concluded that Kazakhstan's innovation policy did not result in a coordinated strategy for developing an innovative economy; actions in the domains of research, higher education, industry and government initiatives remained predominantly isolated. Universities were particularly criticised for not generating innovations or establishing economically useful research institutes.

The methodological approach adopted here considered both the macro-regional (CA) and institutional (HEIs involved in the study) levels and was implemented by means of defining questionnaires for data identification at both levels, complemented by desktop research. The questionnaire for CA HEIs was designed to provide relevant data about each HEI situation and positioning in their local and regional knowledge triangle, in order to assess the university-enterprise liaison structures, and the extent of entrepreneurial and research cooperation with their business environments. The data gathered included quantitative and qualitative indicators, and the questionaire was completed by the 14 HEIs. The approach was based mainly on The Innovation Union Scoreboard (EC, 2011) which provides a comparative assessment of the

innovation performance of the EU27 Member States and the relative strengths and weaknesses of their research and innovation systems. The data gathered in the five CA country reports was structured in three main blocks (Enablers, Firm Activities, Outputs), a total of eight innovation dimensions and 22 indicators as shown in Table 4.1.

Blocks	Dimensions	Indicators
Enablers Main drivers of innovation performance external to private firms	*i. Human resources* *ii. Research systems* *iii. Finance and support*	▪ New doctorate graduates per 1000 population aged 25-34 ▪ Percentage of population aged 30-34 having completed tertiary education ▪ % youth aged 20-24 having attained at least upper secondary level education ▪ International scientific co-publications x million ▪ Non-national doctorate students as % of total ▪ Public education expenditures as % GDP ▪ Public expenditure in R&D as % of GDP ▪ Venture capital as % of GDP ▪ Private credit as % of GDP
Firm Activities Innovation efforts at the level of the firm	*i. Firm investments* *ii. Linkages & entrepreneurship* *iii. Intellectual assets*	▪ Business R&D expenditures as % of GDP ▪ Non R&D expenditures as % of turnover ▪ SMEs innovating in-house as % of SMEs ▪ Firm renewal rate ▪ Public-private co-publications x million population ▪ Patent applications x million population ▪ Trademarks x milion population ▪ Technology Balance of Payments flow as % of GDP
Outputs Effects of firms' innovation actitivities	*i. Innovators* *ii. Economic effects*	▪ SMEs introducing product or process innovations ▪ SMEs introducing marketing or organisational innovations ▪ High growth innovative enterprises ▪ Employment in knowledge intensive activities ▪ Medium and high tech product exports ▪ Knowledge intensive services exports ▪ New to market and new to firm sales ▪ License and patent revenues from abroad

Table 4.1: Innovation Performance Indicators

Characteristics and descriptive metrics were also included in the questionnaires in order to extract data for the institutional level (metrics – per year, including statistics for three years – 2013, 2012, 2011). These are summarised below:

- Existing strategies and approaches for innovation catalyzation, technology transfer, commercialization of ideas, start-up establishment, business incubation, UBC, support from government, regional/city councils, and tools available for young entrepreneurs etc.
- Main areas of innovation.
- Leadership of innovations (organisational structure, responsible actors etc.).
- Strategies and instances fostering UBC
- Level of cooperation with industry
- Physical infrastructure for innovation catalyzation (experimental labs, conference rooms etc.).

Analysis of the surveys identified the perceived blocks (inhibitors) to accelerating innovation and changing mind-sets. These fell into a number of categories. Firstly, a lack of resources and support was highlighted. This included low levels of financial support from government to help cover the (high) costs of innovation and the inability and unwillingness of financial institutions and markets to provide long-term funding for research. Overall there was a low level of investment into research. Lack of physical resources was also frequently mentioned. Research laboratory facilities were criticised as being below international standards. Skilled labour shortages were also cited, notably a shortage of qualified researchers able to interact with industry, compounded by a loss of skilled researchers to other activities, for example employment in multinational companies. Gaps in the innovation process between invention and commercialization, and research being conducted in isolation from a consideration of "productionisation" issues, were also stressed. Overall enterprises were considered to have weak technology bases.

A dearth of productive relationships between "science", HEIs and industries was cited, along with a lack of commitment from senior management in industry and HEIs to support innovation activity. Furthermore, a lack of self-awareness of the two key actors in the UBC was highlighted. At HEI level, an absence of strategic vision for UBC was noted, together with non-existent innovation management and UBC instances. An inability to marshal, focus and exploit synergies between actor activities was also a major inhibitor. Misunderstanding and mismanagement of IPR (intellectual property rights) added to coordination difficulties. Perhaps

the most worrying inhibitors were cultural and societal. This included lack of interest and motivation among young people for careers in science and technology and a perceived lack of demand for technological innovations. Innovation was considered as being very risky from a broad range of perspectives.

To summarise, the data assessment revealed a number of criticial elements affecting CA HEIs:

- There is a reduced experience and practices in the field of entrepreneurial activities' support and, in general, "entrepreneurial and innovation culture" in CA HEIs. As a consequence there is the lack of contextualized UBC knowledge.
- The links between HEIs and their business environment is still weak, caused by the situation when universities are not prepared to meet the needs of business and customize the results of their activity, while business hardly consider universities as relevant partners in the innovation chain. Thus, there is a need of novel, context-appropriate UBC instances that support the "third University mission".
- Existence of many "white spots" in the different national legislations concerning measures of governmental support to create favorable conditions for a transition to innovative development.
- HEIs in CA are only just engaging in the processes needed to develop tailored strategies to support UBC, those existing to date being characterized by limited approaches focusing in very few UBC elements (essentially in curriculum development and commercialization of R&D results).

5. Action Planning and Action Taking: principles

The benchmark study provided knowledge concerning the characteristics of European innovation schemes (e.g. innovation labs, science parks, incubators, living labs etc.). In order to select a sound and reasonable scheme attuned to their own aspirations, CA participants and researchers mapped the characteristics of the identified schemes onto project requirements and the contextual characteristics of CA. This resulted in all participants agreeing to create a typology of UBC solutions that we decided to call "InnoLabs". An InnoLab is defined as a context-appropriate and user-centred UBC instance designed to fulfil a dual mission: 1) to co-create service innovations (to increase competitive advantages for practitioners), and 2) to identify new knowledge for the research community. In contrast to "mega" science parks aimed at developing a wide range of services for diverse business domains, an InnoL ab is small-scale and focuses on the co-creation of service innovations and knowledge for a single domain. They

are also different from living labs in aiming to fulfil a dual mission. An InnoLab is a physical space where actors from universities and businesses can meet, share and access knowledge in order to prioritize problems and to co-create solutions (i.e. innovation) to those problems. We also agreed that each InnoLab must have a manager and relevant staff supporting its specific mission. Finally, we jointly formulated design principles that should facilitate the work to shape 14 InnoLabs. An Innolab:

- Is driven by open innovation
- Shares risks and rewards between actors
- Supports an interdisciplinary approach to problem solving
- Supports multi-stakeholder design and exploitation of knowledge
- Contributes knowledge to the research community, society and industry
- Provides a favourable environment for risk-taking
- Supports study programmes and teachers at the university by disseminating knowledge and providing challenging real-world experiences for students
- Promotes a collaborative environment to foster co-creation
- Has access to the latest research in specific areas
- Supports the application processes for research funding
- Exposes students to industry leading entities and job opportunities
- Actively involves users at all stages of development (co-creation)
- Brings together different disciplines and approaches from design, science, technology and business

In order to identify a specific InnoLab mission, each of the 14 CA university participants matched their core competences to business needs in the surrounding environment. This was mainly done by CA participants, interviewing major industries about their experienced needs and challenges. Examples of domains that the CA participants identified as essential for their local context (and which corresponded to their specific competences) included transport, textiles, digital technology, retail, tourism, and oil bio-products.

Drawing on INOCAST learning and experience, CA participants specified and formulated unique InnoLab strategies including: visions, service portfolios, equipment, physical spaces, partners, feasibility plans and risk plans. These strategies were presented for collective comment and discussion at project workshops and shared between all participants. Each

strategy included a “Business Model Canvas” template (Osterwalder, 2010) which, when completed by the participants, summarized the main elements of their InnoLabs including value propositions, key actors, cost and revenue streams. The canvases also promoted constructive discussion and comparison of InnoLab plans between all project participants. Another important task while formulating strategies was to identify solution objectives for each InnoLab. One argument for this was that we wanted InnoLab stakeholders to work towards common goals. Another argument was that we wanted to know when we could claim that a specific InnoLab was fulfilling its purpose. When strategies were accepted by all partners, action was taken to realise them. In order to test implemented routines, processes, competences, and equipment, each InnoLab conducted a “pilot” where staff worked together with businesses to produce at least one novel mutually beneficial activity.

5.1 Evaluation and Specifying Learning

In this phase, data on the results of the interventions in practice was collected and analysed. All project activities featured feedback sessions from EU researchers to CA respondents. In part these were straightforward summaries of activities which had taken place but, more interestingly, especially from a research point of view, were sessions where EU researchers went beyond a simple rapporteur role to question CA respondents on issues which had come to the fore. Such sessions resembled focus groups in that project activities provided the stimulus material for semi-structured debate amongst respondents. EU researchers took notes of these sessions. The iterative nature of these sessions helped ensure consistency and reliability in the research and reduce the possibility of bias. The (formal) project activities concluded with a final workshop where findings were shared, discussed and agreed. These were also highlighted in reports of the workshop.

6. Conclusions

The defining lessons that can be drawn from this reserach can be encapsulated in five contrasting views of the world; these are:

Instability	vs	balance
Focus on products	vs	development of services
Competition	vs	cooperation and co-creation
Pursuit of financial returns	vs	generating value
Acquiring technology	vs	developing knowledge

6.1 Instability vs balance

Section 2 of this paper identifies the importance of achieving a balance in UBC and other activities aimed at creating an innovative and knowledge-based economy. There are, of course, other dimensions of "balance" which might be desirable, for example having a diversified economic base, but this may not be possible or desirable on a local or regional basis. At a macro level a balanced configuration for the economy is often seen as an ultimate aim.

This desirable configuration contrasts with the reported reality in CA countries and regions as analysis of the institutional surveys and country reports showed. Government is depicted as a reluctant partner in supporting innovation with funding. Senior managers in industry and universities lack commitment and multi-nationals are believed to poach key researchers. Invention and commercialisation are separated by a gulf which is treated as unbridgeable given current levels of resourcing.

6.2 Products vs services

Only one InnoLab targeted the provision of expert services as being the main element of the offer, whereas improving product quality was cited by the majority as a major component of planned activity. The transformation journey towards helping businesses develop capabilities to provide services to supplement, enhance or even replace traditional product offerings was barely in evidence. The mindset inherent in Service-Dominant (S-D) Logic (Vargo and Lusch, 2016) was, at best, not yet a consideration in InnoLab developments or, at worst, alien to the way in which CA participants viewed their potential impacts on innovation activity. This argument is developed elsewhere by Göbel and Leal (2016).

6.3 Competition vs cooperation

Co-creation is at the core of successful UBC. Cooperation is the key to the stability of the Triple Helix. Competition should occupy, at most, a back seat. The ideal is the culture and practice of co-creation of value. InnoLabs could play an important role in coordinating the institutional arragements and actor activities which underpin innovative routes to value-creation. Potential and actual beneficiaries of InnoLab activities are amongst the key actors needed for success. However, there was little evidence that potential beneficiaries were prioritised as stakeholders, despite their key role in determining the value of InnoLab outputs.

6.4 Income vs value

The notion of "value" was narrowly interpreted by CA participants. Some recognised that an InnoLab could provide value for students, be a vital source of projects and internships, inform and enrich the curriculum, enhance institutional reputation, generate employment opportunities for graduates and so on. In one case it was proposed that services would be provided without charge, but with the clear recognition that the InnoLab could generate value in other ways. In this case the host HEI funded the InnoLab from other income. An InnoLab gives enterprises access to potential employees, can help reduce the risks of product experimentation, expose staff to new ideas, promote access to new networks and provide specialist resources when needed; the possibilities extend far beyond the immediately obvious cost-saving or revenue-generating ones. However, these recognitions have not yet infused InnoLab activity.

6.5 Acquiring technology vs developing knowledge

An InnoLab is intended to be a space where opportunities for innovation and development can be created and fostered and a prominent role for universities promoted in collaboration with industry and government to generate new institutional and social formats for the production, transfer and application of knowledge. The Triple Helix was used throughout the delivery of INOCAST as a means of structuring the debate as to how InnoLabs might work and to provide a continuous narrative through those discussions. Despite this heavy emphasis on the desirability of developing a triadic relationship there was little evidence that this formed a major element of InnoLab plans.

Very few of the InnoLab business plans made reference to regional economic development plans. It would be very surprising if external environment elements did not influence regional

economic development strategy in some way or other. Some plans identified these issues but then went on to discuss possible InnoLab activities as though they did not exist. It is quite clear from the country reports produced at the outset of the research that specific regional problems do exist. InnoLabs have the potential to generate value for regional policy makers, the regional economy (by helping it become more competitive and generating employment) and for society in general, but this aim was not visible.

As the "father" of the Triple Helix model recently expressed it:

The problem with Kazakhstan is that it buys technology, but not knowledge. This means that in two years, when this technology becomes outdated, the country will buy newer and even more expensive technology. The role of innovation management is therefore very important for the country.

What is true for Kazakhstan, perhaps the most developed CA country, is even more apparent in the rest.

1. Article reporting on a seminar given by Henry Etzkowitz at Singapore University, September 9, 2016. https://cmp.smu.edu.sg/amb/article/20160913/innovation-and-triple-helix

Appendix 1: INOCAST Partners

CA Partners

Amanzholov East Kazakhstan State University	Kazakhstan
L.N. Gumilyov Eurasian National University	Kazakhstan
KIMEP University	Kazakhstan
Kazakh Academy of Transport and Communications	Kazakhstan
International University of Kyrgyzstan	Kyrgyzstan
Kyrgyz State Technical University	Kyrgyzstan
Kyrgyz National University	Kyrgyzstan
Tajik State University of Law, Business and Politics	Tajikistan
Technological University of Tajikistan	Tajikistan
Turkmen State Institute of Transport and Communication	Turkmenistan
Turkmen State Institute of Economics and Management	Turkmenistan
Bukhara State University	Uzbekistan
University of World Diplomacy	Uzbekistan
Andijan Agricultural Institute	Uzbekistan

EU Partners

Coventry University	UK
Riga Technical University	Latvia
Universitat Autonoma de Barcelona	Spain
University of Boras	Sweden

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