

# Enhancing context sensitivity of the Triple Helix model: An institutional logics perspective

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**Track 3**: Overall performance of the Triple Helix Approach: From efficiency of factors of production to ‘modes of coordination’

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## Bionotes

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## **Abstract**

While the Triple Helix relationship between university, industry and government has been commonly used a key concept guiding national and regional innovation policies around the world, there is an emerging awareness that no one-size-fits-all approach can be used in developing innovation systems. Particularly, there is a debate on whether the Triple Helix model, originally developed in the Western context, can also be applied in developing and even emerging economies. One criticism is that the conceptualisation of the model pays little attention to contextual effects. This paper tries to enhance the context sensitivity of the Triple Helix by using insights of institutional logics. It identifies the institutional logics in which the Triple Helix model is grounded in Western societies and uses these as a basis to develop a benchmarking framework for understanding to what extent the Triple Helix model, as well as associated activities, can be developed in other contexts, and what possible challenges exist.

**Keywords:** Triple Helix, Innovation system, Institutionalism, Institutional logics

## **1 Introduction**

Innovation systems consist of complex functions and interactions among various organisational actors, including government, enterprises, universities and research institutes, as well as institutions in the forms of governmental policies and social norms (Edquist, 1997; Kumaresan and Miyazaki, 1999; Lundvall, 1992; Nelson, 1993; OECD, 1999). Accordingly, Etzkowitz and Leydesdorff (1995, 1997) have developed the Triple Helix model for understanding dynamic interactions between university, industry and government, which foster entrepreneurship, innovation and economic growth. In the studies of innovation systems, research policy and higher education, the Triple Helix model has been commonly used as a normative framework for understanding interactions between

key actors in innovation processes. It has also become a common strategy of many governments in developing national and regional innovation systems. One fundamental statement in the Triple Helix thesis is that the Triple Helix interrelations between academia-industry-government provide the optimum conditions for fostering innovation (Etzkowitz and Leydesdorff, 2000; Leydesdorff and Etzkowitz, 1998).

In spite of the popularity of the Triple Helix model, it has not been without problems. Among many other criticisms, such as the Triple Helix model being highly abstract (Cooke, 2005), lacking clear theoretical foundations at a micro level (Shinn, 2002; Viale and Pozzali, 2010), rarely addressing the problems and contradictions in the process of each actors taking the role of the other (Tuunainen, 2002), one attack, as highlighted in this paper, is that the Triple Helix model has paid little attention to national contexts (Balzat and Hanusch, 2004; Shinn, 2002) and other social settings (Cooke, 2005). Therefore, the Triple Helix model can hardly provide appropriate rationales on which systematically structured criteria and indicators may be developed for researching, measuring and comparing different empirical cases (Mowery and Sampat, 2004), especially when the cases are in different national and cultural contexts (Eun et al., 2006). For instance, due to the difference of national and local contexts, not all universities have the potential to become entrepreneurial as posited in the Triple Helix model (Jacob et al., 2003).

This implies that the Triple Helix model pays little attention to context effect, which is defined as “the set of factors surrounding a phenomenon that exert some direct or indirect influence on it” (Whetten, 2009, p. 31). Drawing on McKelvey (2002), Whetten (2009) suggests that whether a theory is valid or not is basically a matter of contextual sensitivity. A theory should not merely deal with e.g. X and Y relationship but must also include explanatory factors which are associated with higher levels of (contextual) analysis than those expressly under investigation; “investigators should

not ‘test’ hypotheses to determine if they are true or false, but rather they should determine the conditions under which a particular hypothesis holds” (Whetten, 2009, p. 38).

It should be noted that the formation of the Triple Helix model is a result of inductive theorising mainly in the contexts of Western countries. As to whether the Western-context-based Triple Helix treatment can be applied in other countries, two kinds of responses can be seen in the literature.

In one group, the scholars directly employ the Triple Helix model in their studies in developing or emerging economies regardless the contextual differences (See example: da Silva et al., 2012; Saad and Zawdie, 2011; Saad et al., 2008; Zhou and Peng, 2008). The researchers in the other group are very sceptical of the applicability of the Triple Helix in less economically developed countries, and therefore tend to build up different, often context-specific, frameworks for understanding the interplay between innovation actors (See example: Bernasconi, 2005; Eun et al., 2006; Williams and Woodson, 2012; Zawislak and Dalmarco, 2011). However, as the analytical frameworks developed in these studies are ad hoc, the findings and analyses are less comparable to practices elsewhere.

Can we achieve a balance whereby on the one hand we could fully utilise the insights from the Triple Helix concept and on the other we are able to take into account of specific contexts when analysing innovation activities in different national and cultural contexts? This is a matter of theory improvement for the Triple Helix model. As noted by Whetten (2009), “all theories are context bounded...they should not unknowingly be applied in circumstances that exceed their operational boundaries”. Therefore, when using the Triple Helix model for cross-context analysis, we need first to know what the boundaries or contexts of the Triple Helix are. Though not specifically referring to the Triple Helix, Edquist (2001) criticised that, in general, innovation system approaches overemphasise the interplays between organisational actors while paying little attention to institutional environments where the organisational actors are situated and their actions take place.

Sotarauta and Kosonen (2013) push forward this point by arguing that innovation policies are context sensitive and therefore must be customised according to local conditions.

In this paper, the author will try to theorise context effects of the Triple Helix by using the theory of institutional logics (Friedland and Alford, 1991; Thornton et al., 2012). Institutional logics can be generally understood as “macro-level belief systems that shape cognitions and influence decision-making processes in organisational fields” (McPherson and Sauder, 2013). It is the multiple and contending logics that provide the dynamic for potential change in organisations and societies (Friedland and Alford, 1991).

Therefore, when the Triple Helix model initially developed in Western societies, there must have been certain institutional logics that facilitated the process. As these institutional logics may not exist in less developed countries, the trajectory of the development of innovation policies, particularly in terms of the adoption of the Triple Helix model, may appear in different patterns depending on the traditional and local contexts. It should be noted that even among Western countries distinctions between institutional logics can be found, but more contrasting institutional settings are often seen between Western/developed and non-Western/developing contexts. In this paper, I try to identify some common and ideal institutional logics in Western countries that foster the formation and development of the Triple Helix model.

When the Triple Helix model is introduced in nations or regions beyond the non-Western context, to what extent the local institutional logics are compatible or incompatible with the ideal or Western institutional logics may determine to what extent the model can be adopted in local innovation policies. Before reaching this end, it is necessary to first know what are the key ideal institutional logics and in what domains to compare these logics to those in other contexts.

In this train of thought, this study is aimed at identifying the institutional logics underlying the Triple Helix model in Western societies and hence developing a benchmarking framework with a

potential for policy makers and researchers to understand how desired university-industry-government Triple Helix relations and activities can be developed in a specific context from the institutional logics perspective and subsequently analyse possible challenges? The challenges are due to the incomparability of institutional logics, for instance, between the ones associated with the Triple Helix model and the ones embedded in the local society. As mentioned, it is the challenges or the contradictions inherent in the differentiated set of institutional logics that provide individuals, groups and organisations with resources for change (Friedland and Alford, 1991).

This study will start with a short introduction of key concepts of institutionalism and institutional logics. It is followed by presentation of the Triple Helix model as well as a discussion on the relevance of institutional logics perspective for understanding it. Then it identifies typical activities and practices postulated by the Triple Helix model mainly in Western countries, and trace what are the operational institutional logics behind them. Next, these institutional logics will be grouped in several categories and linked to different stages of Triple Helix development. When studying the application of Triple Helix concept in a specific country, these categories will be used as a benchmarking framework for examining what are the corresponding institutional logics in the country and further analysing how these institutional logics can facilitate or inhibit the Triple Helix activities. The framework can also serve as an analytical tool for comparing Triple Helix models in different contexts. Nevertheless, the paper is very theoretical and even for some aspects speculative and more examples and will need to be refined by more existing examples and further empirical research concerning national and regional contexts of innovation systems.

## **2 Institutional theory and the institutional logics perspective**

Institutional logics perspective (Friedland and Alford, 1991) emerged as one variant of new institutional theory. Thornton et al. (2012) argue that the institutional logics perspective distinguishes itself from the new institutional theory and transforms the new institutional theory:

*A core premise of the institutional logics perspective is that the interests, identities, values, and assumptions of individuals and organisations are embedded within prevailing institutional logics (Thornton and Ocasio, 2008). This idea distinguishes an institutional logics perspective from macro structural approaches, which emphasise the primacy of structure over action (DiMaggio and Powell, 1983), as well as Parsonian (1956) perspective on institutions, which separate the institutional from the economic and technical sectors of society (Meyer and Scott, 1983).*

In addition to institutional logics, the other two key concepts in institutional theory, namely institutions and institutionalisation will be presented in this section. All these concepts are important for understanding the Triple Helix from an institutional logics perspective.

## **2.1 Institutions**

One fundamental concept in institutional theory is institution. Institutions can be generally understood as social orders (Berger and Luckmann, 1967), social rules (Burns and Flam, 1987), or a logic of appropriateness (Olsen and March, 2004), composed of appropriate rules and exemplary behaviour. Social orders, rules and exemplary behaviour become institutions when they are seen by actors as natural, appropriate, expected, and legitimate. In other words, they are institutionalised. Scott (1995) distinguishes institutions by “three pillars”, namely regulative, normative and cultural-cognitive elements. The regulative processes involve the capacity to establish rules and the power to exercise control over others’ conformity to the rules. The central ingredients of regulative institutions are force, fear and expedience tempered by the existence of rules. In the normative pillar, social obligation is central to social life, and the building blocks are values and norms which form the basis of social obligation. Values can be simply interpreted as what people think important

or right. Norms derived from values directly influence people's actions by specifying how people are supposed to behave. The cultural-cognitive pillar emphasises basic assumptions, which determine how realities are perceived and how things should be done. These assumptions are so taken for granted that, within the cultural unit, other types of behaviour are inconceivable. Thus, the basic building blocks in cultural-cognitive systems are meanings and common frameworks of references.

## **2.2 Institutional logics**

The concept of institutional logics was first introduced by Friedland Alford and Friedland (1985) when describing how contradictory practices and beliefs inherent in the modern Western societies shape individuals actions in the political arena. Friedland and Alford (1991) further developed the institutional logics approach as an explanation for institutional change: modern Western societies have central institutions that have potentially incompatible institutional logics; it is the incompatibility of logics that provides the dynamic for potential change. Since then it has developed into a growing research area in organisation studies. However, the institutional logics perspective had not been elaborated in a poised and systematic manner, until the publication of Thornton et al. (2012)'s book—"The institutional logics perspective: A new approach to culture, structure, and process".

The Institutional logics perspective is developed from the new institutional theory, sharing views with Meyer and Rowan (1977), Zucker (1977) and DiMaggio and Powell (1983) about how institutions shape organisational structures and constrain individual behaviours. It also distinguishes from and transforms the new institutional theory, in that the focus is no longer isomorphism, but on the effects of differentiated (macro-societal level) institutional logics on the practices of individuals and organisations that provide sources for change, and the influences of individual and

organisational actors on changing institutional logics (Thornton and Ocasio, 2008; Thornton et al., 2012).

According to Friedland and Alford (1991), each society or institutional system consists of a set of institutional orders and each of the institutional orders has a central institutional logic that constitutes its organising principles and is available to organisations and individuals to elaborate. Institutional logics have both material and symbolic characteristics. Following such understanding, Thornton and Ocasio (1999) define institutional logics as “the socially constructed, historical pattern of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organise time and space, and provide meaning to their social reality”.

Building on Friedland and Alford (1991)’s identification of five key elements in interinstitutional system, namely capitalist market, bureaucratic state, democracy, unclear family and Christianity, Thornton et al. (2012) extended the scheme to seven sectors: the market, the corporation, the professions, the state, the family, the community and religions. They call these ideal types of institutional logics and propose to use the ideal types as meta-theory and as a method of analysis. However, in a society the institutional logics are not limited to these categories at the state level. Rather the institutional logics can be examined at the organisational field level (Greenwood et al., 2011) and even within a single organisation (McPherson and Sauder, 2013). When applying the institutional logics perspective in understating the development of the Triple Helix model, the logics under investigation may cross several organisational fields, such as the organisational fields of university, industry and government.

### **2.3 Institutionalisation**

Drawing on Meyer and Rowan (1991), Gorges (2001) define institutionalisation as “a process where social processes, obligations or movements reach a rule-like status in social thoughts and

actions. They are unquestionable and cannot be compared to alternatives”. Similarly, DiMaggio and Powell (1991) argue that “institutionalisation tends to reduce variety, operating across organisations to override diversity in local environments”. Institutionalisation processes take place within organisational fields. An organisational field is defined as “those organisations that, in the aggregate, constitute a recognised area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organisations in the field” (DiMaggio and Powell, 1983). The organisational field involves a process of structuration, which occurs through interaction and information exchange, generating structures of prestige dominated by certain organisations as well as shared norms and practices. Once an organisational field has become mature, whatever change occurs will lead toward greater conformity.

Social movement often becomes institutionalised or isomorphic across national contexts (Cai, 2010). For instance, the Triple Helix as a strategy for developing innovation systems tends to be commonly adopted in most countries in the world, regardless of their economic development levels and traditional cultures. Therefore, the development of the Triple Helix model can be understood as a process of institutionalisation (Benner and Sandström, 2000).

Several stages can be distinguished along with the institutionalisation process. Greenwood et al. (2002) outline six stages of institutional change, including 1) precipitating jolts, 2) de-institutionalisation, 3) pre-institutionalisation, 4) theorisation, 5) diffusion, and 6) re-institutionalisation. In the process, some institutions disappear while emerging structures spread and gain legitimacy throughout an organisational field to become institutionalised. Some other studies have developed similar frameworks for understanding institutionalisation processes, such as Rogers’ (2003) five stages model: 1) agenda setting, 2) matching, 3) redefinition, 4) clarifying, and 5) routinizing) and Levine’s (1980) four stage model: 1) recognition of needs, 2) planning and

formulating a solution, 3) initiation and implementation of a plan, and 4) institutionalisation or termination).

All these authors share a common understanding that the institutional change basically includes three stages: first, organisational actors realise there is a need for change; then they initiate organisational changes; and finally the changes either get institutionalised or terminated. As the Triple Helix framework involves organisations from different sectors, the organisational changes can be understood from two dimensions: intra-organisational and inter-organisational. I will later use this structure to set out the stages of the development of the Triple Helix.

### **3 Triple Helix model and institutional logics**

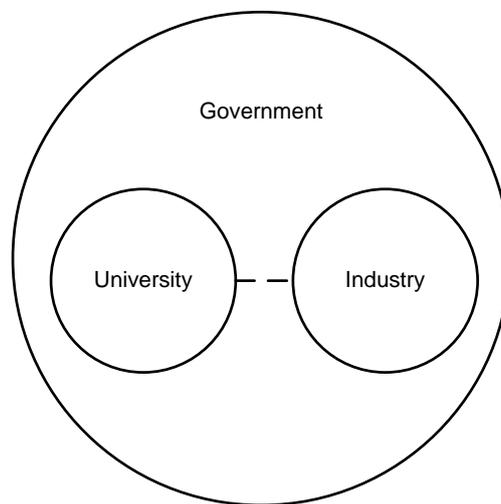
The rise of the Triple Helix model has happened alongside the rise of the knowledge-based economy and innovation system, in which economic growth is based on continuous innovation and advancement in science and technology. According to the Triple Helix Conference official website, the Triple Helix concept is defined as follows:

*The Triple Helix concept comprises three basic elements: (1) a more prominent role for the university in innovation, on a par with industry and government in a knowledge-based society; (2) a movement toward collaborative relationships among the three major institutional spheres, in which innovation policy is increasingly an outcome of interaction rather than a prescription from government; (3) in addition to fulfilling their traditional functions, each institutional sphere also "takes the role of the other" performing new roles as well as their traditional function. Institutions taking non-traditional roles are viewed as a major potential source of innovation in innovation. (Triple Helix Conference Website, 2011)*

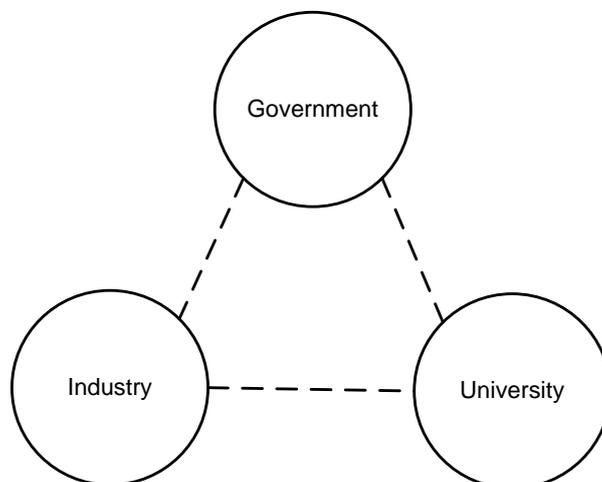
The Triple Helix relationship of university-industry-government is, to a large extent, about competition and cooperation for resources, redistribution of power, and network building. From the institutional logics perspective, the meanings of power, resources and networks vary by institutional logics (Thornton et al., 2012). Therefore, the evolution of the Triple Helix model may have different trajectories in different institutional contexts. As such, Etzkowitz (2002, 2008) distinguishes three types of Triple Helix models. A desired or ideal model is overlapping triple helix

relations between university, industry and government, but develops from two opposing standpoints, namely the statist and laissez-fair models.

In the statist model (Figure 1), government controls both academia and industry, and is expected to take the lead in developing projects and providing the resources for new initiatives. The examples can be seen in former Soviet Union, France and many Latin American countries. In the laissez-faire model (Figure 2), industry, academia, and government separate and are independent from each other. These actors interact only modestly across strong boundaries. This model is typically exemplified by the US.



**Figure 1. Statist Model**



## Figure 2. Laissez-faire Model

A global tendency is a move towards an overlapping or an ideal model (Figure 3), in which the three institutional spheres overlap and collaborate with each other. The model represents a change “from one of strong boundaries between separate institutional spheres and organisations to a more flexible overlapping system, with each taking the role of the other” (Etzkowitz, 2002). The core idea in an ideal Triple Helix model is that academia should be closely linked with the industrial world. To support the role of the university, government is supposed to offer incentives and encourage academic institutions to go beyond performing the traditional functions of education and research.

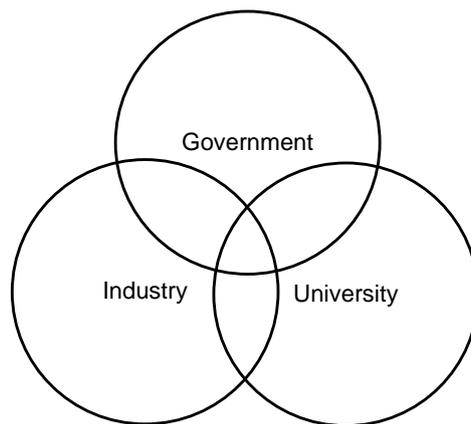
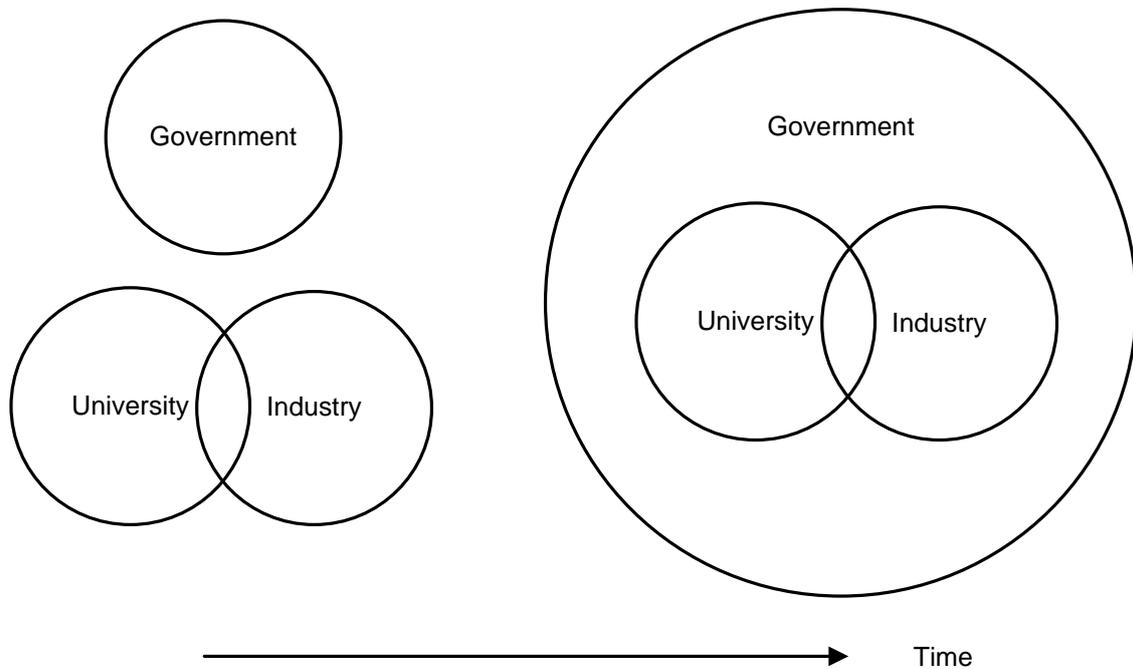


Figure 3 Overlapping model

In a study on the role of universities in regional innovation systems in China, Cai and Liu (2013) have identified a new Triple Helix model (Figure 4), which is called delayed government-led model based on the development of the Tongji Creative Centre. At the initial stage, it was driven by the spontaneous spill-over of Tongji university spin-off companies located around the university campus. When the cluster of these companies began to grow, the neighbouring community played an important role to meet the increasing spatial needs of housings and offices. In light of Chinese

urban strategy, which emphasises the role of science and education in economic restructuring, the cluster gradually got special attention from multi-level governments with financial and institutional support. Regardless of the various driving forces throughout the development path, the government eventually became the leader in the development of Tongji Creative Cluster.



**Figure 4. Delayed government-led model**

According to Etzkowitz (2008), “the specific contexts of industrial clusters, academic development and the presence or lack of governing authority influence the development of the Triple Helix”.

However, the different cognition and behaviour of actors in the Triple Helix framework are shaped by broader belief systems or social institutions than those emphasised by Etzkowitz (2008).

Between developed and less developed countries, the institutional differences are not merely about different economic structures and governance models of academia and industry, but also political systems, cultural traditions, and social beliefs. All these are concerned with institutional logics.

Against the above considerations, the strength of the institutional logics perspective lies in its

explanatory power on how cultural elements influence organisational change (Thornton and Ocasio, 2008). It may provide a potential solution to the intrinsic limitation of the Triple Helix concept in its applications in different cultural contexts.

#### **4 Four stages of development of the Triple Helix and linking institutional logics**

The Triple Helix literature (Etzkowitz, 2002, 2003, 2008; Etzkowitz and Leydesdorff, 1997, 2000; Leydesdorff, 2012; Leydesdorff and Etzkowitz, 1998) implies that the development of the Triple Helix takes several steps. For instance, Etzkowitz (2008) has more explicitly distinguish three steps of the development of the Triple Helix, namely “triple helix impetus”, “taking the role of the other” and “from bilateral to trilateral interactions”. Here, I will re-interpret the development of Triple Helix from the perspective of institutionalisation, in which four stages are suggested: 1) realisation of needs, 2) intra-organisational transformation, 3) inter-organisational interactions between university, industry and government, and 4) institutionalisation of the Triple Helix concept. Although these are presented in sequential order, the second and third stages can take place almost at the same time.

While the Etzkowitz’s three-step model tends to describe the path to the ideal Triple Helix model from two opposing standpoints: a statist model and a laissez-fair model, the four-stage model focuses on the development of the ideal Triple Helix model. Another difference is that Etzkowitz mainly looks at the development process from a time sequential perspective, but my attention is on how the concept of Triple Helix has been institutionalised. Nevertheless, there are many overlapping between the two models and Etzkowitz’s work has provided solid foundations for my interpretation of the development of the Triple Helix.

Next, I will discuss 1) the relations between different organisational actors (such as universities, industry and government) and associated activities in each stage of Triple Helix evolution and 2) which institutional logics influence the actors to act in the ways as posited by the Triple Helix model. The institutional logics, where the key actors are embedded, vary between national contexts. The institutional logics prevailing within one country will strongly affect how the actors communicate their interests, determine which problems are salient and which solutions are appropriate (Thornton et al., 2012). As the development of the ideal model of Triple Helix can arguably be best explained in Western contexts, the focus here is to identify most typical institutional logics predominant in Western countries that facilitate the Triple Helix evolution.

## **4.1 Stage 1**

### ***4.1.1 Activities***

In the first stage, as suggested by Etzkowitz (2008), “a Triple Helix regime typically begins as university, industry, and government enter into a reciprocal relationship with each other in which each attempts to enhance the performance of the other”. The rationale behind the cooperation is the belief that knowledge and technology become key to economic growth. The rapid development and increasing complexity of technology can largely alter the environment of many types of organisations. It has been realised that a single organisational sector alone can no longer respond to changes and uncertainties unless they cooperate with each other. In this stage, the collaboration between university, industry and government for enhancing the local economy is mainly through their traditional roles. For example, universities and other knowledge producing organisations make up the core spiral of knowledge generation. Universities produce and transfer more knowledge to industry and for society, while gaining additional funding sources from industry and government to strengthen the performance of research. These changes gradually lead to the next steps of Triple Helix development.

### ***4.1.2 Key institutional logics in Stage 1: social beliefs on the knowledge as a key to economic growth***

In many Western countries, there is a broad social consensus that economic competition consists of creating new and better products. As such, the enhancement of knowledge generation and technology innovation becomes essential. Due to such a belief, although many Western universities have suffered governmental budget cuts since the 1980s, the actual public funding spent on higher education has not declined but is directed through more diversified channels. For instance, some public funding is used to incentivise and to promote university and industry cooperation for knowledge generation and knowledge transfer. Another governmental strategy is to concentrate funding in supporting research and development (R&D) in fast-growing or high-potential areas with the expectation that the investment will eventually pay off through economic growth led by the companies that benefit from cutting edge knowledge. For their own sustainable development, firms themselves also seek cooperation with universities in strengthening their R&D. Under such circumstances, the first stage of the Triple Helix commences, in which university, industry, and government realise the need for developing reciprocal relationship.

## **4.2 Stage 2**

### ***4.2.1 Activities***

In the second step, internal transformation is characterised by “taking the role of the other” (Etzkowitz, 2008). It means that in addition to performing its traditional tasks (as primary activities) each takes the role of the other (as secondary activities). Universities keep their traditional roles of teaching and research, but also devote attention to the capitalisation of knowledge; patents, start-up companies, etc. Firms continue to produce goods and services, but also do research and provide training at high levels (e.g. through a corporate university). Government is responsible for resolving market failures by adjusting public policies and setting up market rules, but also makes available venture capital to start new enterprises, particularly for high-risk business. In spite of taking on the

role of the other, university, industry or government respectively maintain their primary roles and distinct identities. During the process on taking the role of the other, organisational actors in the three sectors have respectively realised that engaging in others' fields is necessary but not sufficient in achieving desired goals. In addition, the internal transformation also causes new challenges and demands within and across sectors. As a solution, they need even closer cooperation and interaction with each other.

#### ***4.2.2 Key institutional logics in Stage 2: Market mechanisms & process management culture***

Taking the role of the other is mainly driven by the market orders, in which the fundamental norms are concerned with self-interest and seeking increasing profit (Thornton et al., 2012). To increase incomes, universities directly engage in business activities, such as selling education and research services, and opening university-owned companies. Meanwhile, companies establish corporate universities to develop the skills of their professionals and managers for the needs of company development. Government also offers venture capital to help start new enterprises to promote regional economic growth. As mentioned, such a phenomenon has been described as "taking the role of the other" (Etzkowitz, 2008). To adapt to the new functions, each sector has to be more innovative in developing innovative organisational structures and strategies.

Taking the role of the other also reinforces and transforms the traditional missions. In addition to teaching and research, universities are expected to be more engaged with society, particularly the industrial sector, developing practical knowledge, applications and services and even becoming economic actors in their own right (this is often called the "third mission" of universities) (Etzkowitz, 2008). While performing the third mission, both university and industry must be innovative in applying existing knowledge and active in knowledge innovation. Knowledge innovation within an organisation can be defined as "a process of knowledge being created by

individuals and amplified as a part of the knowledge network of the organisation” (Yang, 2005).

One key dimension of knowledge innovation is the conversion of tacit knowledge to explicit knowledge (Nonaka and Takeuchi, 1995). This contributes to technology innovation. In addition, technology innovation is also the result of a combination of various explicit knowledge (Yang, 2005). This implies that technology innovation is profoundly based on the traditional functions of knowledge generation or knowledge accumulation.

As observed by Lang Xianping (2009), a Hong Kong-based economist, the success of technology innovation in the West is attributed to a culture of rigid process knowledge management. The main theses of process management can be briefly summarised as follows.

- Technology innovation is always based on the utilisation and application of existing knowledge.
- Managers pay more attention to the processes of product development and technology innovation, rather than the objective.
- The failure of technology innovation is considered the result of management mistakes, instead of the people who develop the technology.

### **4.3 Stage 3**

#### ***4.3.1 Activities***

Thus, the third step of development of the Triple Helix is the evolution of trilateral interactions between the three sectors. In the Triple Helix system, one spiral has significant influence on the other. Meanwhile, through the interactions, organisations in each spiral are able to find new ideas from others to solve problems and meet new needs. This process is characterised by increasing interdependency between the three sectors. For instance, a university’s knowledge production cannot be carried out by itself, but needs industry as not only a source of research problems but also a strong partner in knowledge production. Meanwhile, university technology transfer is dependent on the conditions or environments created by the government. “The firm is thus transformed from a competitive unit related to other firms solely through the market to a Triple Helix entity

increasingly based on relationships with other firms as well as academia and government” (Etzkowitz, 2008). The interactions also result in the creations of hybrid organisations, such as incubators, joint research centres, science parks, etc.

#### ***4.3.2 Key institutional logics in stage 3: Legal environment of intellectual property protection and civil society***

The most crucial development in the Triple Helix inter-organisational relations is the cooperation and interaction between university and industry, and the key is trust between the two parties. Trust for a healthy university and industry relationship is guaranteed by the institutional environment in which intellectual rights can be effectively protected. For instance, the technology transfer between university and industry in the USA has only developed at a fast pace since the 1980 Bayh-Dole Act, which “resolved the contradiction between government ownership of intellectual-property rights of research that it funded at universities and the wish to see those rights put to use” (Etzkowitz, 2008). As provided by the law, universities are able to retain ownership of inventions made under federally funded research. As such, a firm that engages in productising an invention patented by a university can hold an exclusive license once it is granted by the university.

According to Etzkowitz (2008), effective interaction between the three spirals are also subjective to broad social participation, including both top-down and bottom-up initiatives. As such, the Triple Helix model can be best developed in a civil society, which allows free mobilisation and organisation, debates and initiatives and hence encourages diverse sources of innovation. He further implies that successful Triple Helix operation is not coordinated entirely by the state. “Although large projects may be accomplished, it is not the most productive form of Triple Helix relationships since ideas are coming from only one source, the central government; if regional and local levels are active and there is input from universities and industry as well, then there is a much broader

base to develop creative ideas for innovation as well as better base for implementation, especially at the regional and local level” (p.62).

#### **4.4 Stage 4**

##### ***4.4.1 Activities***

The final stage is the institutionalisation of the Triple Helix. It means that the Triple Helix concept as well as its associated activities has become a set of routines or practices that are being reproduced over time and tend to act as a cognitive framework structuring the actions of key actors, such as academia, industry and government. As stated by Benner and Sandström (2000), the Triple Helix model becomes a new kind of institutional order based on the interactions of political, industrial and academic interests, institutionalised in an organisational field consisting of the state, industry and academic system. However, such an understanding tends to have a simplistic view on the institutional environment as if the Triple Helix culture becomes the only institutional order surrounding all of the three groups of organisations. According to the institutional logics perspective, organisations are embedded in different, often conflicting, institutional orders, or an inter-institutional system (Thornton et al., 2012). It should be mentioned that the classic Triple Helix literature does not suggest university, industry and government merge into one organisational field, but that there are overlaps between the three fields. Etzkowitz (2008) has specifically elaborated the institutionalisation of the Triple Helix concept in each sector, though not explicitly using the term institutionalisation.

##### ***4.4.2 Key institutional logics in stage 4: competitive market environment and democracy***

As institutions are composed of three pillars, namely regulative, normative and cognitive, the processes of institutionalisation also occur in all the three categories. Regulative, normative and

cognitive institutionalisation processes are grounded in different logics but also intertwined with each other (Scott, 1995).

The Triple Helix model has often been used by national and regional governments as a strategy to promote the development of innovation systems which challenge traditional ways of organising research (i.e. collegial control) and technology development (Benner and Sandström, 2000). In this respect, the institutionalisation of the Triple Helix starts in the pillar of regulative institutions. The governmental approach is to leverage funding for cooperation between academia and industry.

Although universities and academics may not consider the Triple Helix strategy a right thing to do, most of them take part in Triple Helix activities because they want to secure funding for survival and development. In Colbeck's (2002) words, "[regulative] institutionalisation occurs as individuals find it expedient to comply with the rules". For instance, Benner and Sandström (2000)'s study on "Institutionalising the Triple Helix" mainly deals with the regulative process by emphasising the funding agencies' roles in structuration of the institutional order of the Triple Helix.

"Normative institutionalisation processes are grounded in a collective sense of what is appropriate" (Colbeck, 2002). When the Triple Helix model intends to adjust academic research to industry's knowledge interests, it goes against the traditional academic norms that professors decide what is to be studied. The participants won't believe that the innovation of the Triple Helix model is right unless it has brought them benefits. Therefore, to make the Triple Helix model appreciated by the participants, the funding and evaluation systems must be wisely designed.

The development and completion of the Triple Helix model may take many rounds of revisions and adjustments based on the feedback of the participants. The importance of feedback loops in the evolution of the Triple Helix has been stressed by Viale and Pozzali (2010). As they point out, when a government tries to promote university and industry cooperation by introducing financial incentives for relevant participants, the effect is determined by positive or negative feedback

generated by the incentives' impact on social actors' behaviour. While negative feedback tends to produce resistance to change and leads to inertia, positive feedback breaks the stability of the status quo and catalyses change. Thus, the Triple Helix is likely to be developed in competitive market systems, where feedback mechanisms are well developed. This explains why the phenomena that are associated with the Triple Helix model, such as the second academic revolution, the dual academic career and the entrepreneurial university, are often observed in the competitive university systems of the USA and the UK than in relatively more centralised universities of continental Europe.

To effectively establish the feedback from participants on the policy-making process also requires a political system in which social groups and individuals who are involved in and impacted by a policy programme have a chance to influence the policy-making. This is democratic politics.

The realisation of regulative and normative institutionalisation can already show the success of implementing the Triple Helix model, but it is the cognitive pressures that eventually lead to the final institutionalisation of the Triple Helix. "Cognitive institutionalisation processes occur as more and more individuals assume that an activity is naturally the way things are done, and act accordingly" (Colbeck, 2002). It suggests that individuals find it hard to conceive of alternatives to the model advocated by the Triple Helix. To this end, both the democratic policy-making process and a competitive market environment are crucial.

## **5 A framework for cross-context analyses**

Based on the above discussion, the congruency between ideal institutional logics and Triple Helix activities in each stage is summarised in Table 1. In the environment consisting of the ideal institutional logics, often found in Western societies, the Triple Helix model is likely to be

developed and even institutionalised. These ideal institutional logics are at the levels of both the state and organisational filed.

**Table 1. Institutional orders in the evolution of Triple Helix model**

Stages of development	Major Triple Helix activities	Favourable institutional logics market, state, corporation, profession
Stage 1  Realisation of the needs	Realising the importance of entering a reciprocal relationship between university, industry and government	<ul style="list-style-type: none"> <li>• Shared beliefs on knowledge as a key to economic growth (Logics of economic growth in the field of industry)</li> </ul>
Stage 2  intra-organisational transformation	Taking the role of the other	<ul style="list-style-type: none"> <li>• Market oriented organisational cultures (Logics of market at the state level)</li> <li>• Process oriented management culture in technology innovation (Logics of knowledge management in the fields of industry and academia)</li> </ul>
Stage 3  interactions between	Growing and innovating through cooperation with others	<ul style="list-style-type: none"> <li>• Effective protection for intellectual property rights and market participants (Logics of</li> </ul>

organisations	Generating hybrid organisation	intellectual property at the field of industry)  <ul style="list-style-type: none"> <li>• Civil society (Logics of civil society at the state level)</li> </ul>
Stage 4  Institutionalisation of the Triple Helix model	Feedback loops between policy-makers and participants  Institutionalised norms of “entrepreneurial university”, “knowledge-based formation and growth”, and “innovation state”.	<ul style="list-style-type: none"> <li>• Competitive market environment (logics of competition in the field of university)</li> <li>• Democratic policy-making process (Logics of democracy in the field of government)</li> </ul>

Accordingly, the author proposes the following steps when doing Triple Helix analyses, particularly in non-Western contexts:

First, corresponding institutional orders in new countries must be examined. Specifically, the following issues must be asked:

- What are the shared beliefs (in industry) on the key to economic growth?
- To what extent are organisational cultures in industrial and academic organisations market oriented?
- What is the management culture (process oriented or objective oriented) in organising technology innovation?

- How are intellectual rights protected?
- To what extent can the nation be regarded as a civil society?
- To what extent is market competition established among industry and academic organisations?
- What is the political system concerning policy-making?

Second, the researchers need to compare how the institutional orders in specific empirical cases are different to the ideal institutional orders as summarised in Figure 1. This is a matter of studying institutional difference, which is defined as “the difference/similarity between the regulatory, cognitive, and normative institutions of the two countries” (Kostova and Zaheer, 1999).

Third, after identifying institutional logics in one specific nation and measuring the difference to the ideal institutional orders, it is also important to analyse how such institutional logics may facilitate or constrain Triple Helix activities. In this regard, it helps to explain why the Triple Helix practices in a specific context often have unique characteristics.

## **6 Conclusions**

This paper has tried to further theorise the Triple Helix model by using the insights of institutional logics with an aim to enhance the context sensitivity of the concept. Nevertheless, its objective is modest. It has not applied the full potential of the theory of institutional logics. It mainly focuses on identifying key institutional logics, generally existing in Western societies, which might facilitate the development of an ideal Triple Helix model. It has not discussed how the different logics, e.g. within a Western state, are compatible to or conflicting with each other. This certainly needs further investigation, but it is not a major point stressed in this paper. Rather, the primary intention here is to enrich one’s understanding of contextual effects on the Triple Helix model, particularly in non-

Western contexts. The paper strongly emphasises the importance of comparing the ideal institutional logics underlying the Triple Helix model and the institutional logics of a specific nation or regional which adopts the Triple Helix concept in innovation policies.

As an effort to improve context sensitivity, the Triple Helix model is further elaborated in two ways. First, the Triple Helix Model is seen from the perspective of dynamic evolution, in which four development stages are distinguished. Second, the key activities in each stage are aligned with a variety of ideal institutional logics mainly based on the contexts of Western countries. The identification of ideal logics are preliminary and mainly based on review of relevant literature. More empirical studies need to be conducted to verify and further elaborate the findings and arguments in this paper.

Based on these institutional logics, an analytical framework has been constructed for understanding the context of implementing the Triple Helix model in a specific (non-western) context or for comparative studies. The contradicting institutional logics in a non-western nation to the ideal logics may indicate the challenges for adopting the Triple Helix model in local innovation polices. On the other hand, the competing logics may also provide dynamics for social change.

The analysis in this paper also implies that developing innovation systems, such as the Triple Helix model, is not merely about how to leverage relations of academia, industry and government for dynamic economic growth, but is also a matter of adjusting the institutional environment or institutional innovation.

## **References**

Alford, R.R., Friedland, R., 1985. Powers of theory : Capitalism, the state, and democracy. Cambridge University Press, Cambridge.

- Balzat, M., Hanusch, H., 2004. Recent trends in the research on national innovation systems. *Journal of Evolutionary Economics* 14, 197-210.
- Benner, M., Sandström, U., 2000. Institutionalizing the triple helix: Research funding and norms in the academic system. *Research Policy* 29, 291-301.
- Berger, P.L., Luckmann, T., 1967. *The social construction of reality: A treatise in the sociology of knowledge*. Allen Lane, London.
- Bernasconi, A., 2005. University entrepreneurship in a developing country: The case of the p. *Universidad católica de chile, 1985–2000. Higher Education* 50, 247-274.
- Burns, T.R., Flam, H., 1987. *The shaping of social organization: Social rule system theory with applications*. SAGE Publications, London.
- Cai, Y., 2010. Global isomorphism and governance reform in Chinese higher education. *Tertiary Education and Management* 16, 229-241.
- Cai, Y., Liu, C., 2013. The roles of universities in Chinese regional innovation systems—towards a new triple helix model, *Regional Studies Association European Conference 2013: Shape and be Shaped--The Future Dynamics of Regional Development*, University of Tampere, Finland.
- Colbeck, C.L., 2002. Assessing institutionalization of curricular and pedagogical reforms. *Research in Higher Education* 43, 397-421.
- Cooke, P., 2005. Regionally asymmetric knowledge capabilities and open innovation: Exploring ‘globalisation 2’—a new model of industry organisation. *Research Policy* 34, 1128-1149.
- da Silva, C.E.L., Narcizo, R.B., Cardoso, R., 2012. The proximity between academy, industry and government: Towards a more sustainable development of a brazilian oil region. *Procedia - Social and Behavioral Sciences* 52, 100-109.
- DiMaggio, P.J., Powell, W., 1983. The iron cage revisited: Institutional isomorphism and collective rationality. *American Sociological Review* 42, 147-160.
- DiMaggio, P.J., Powell, W.W., 1991. Introduction, in: Powell, W.W., DiMaggio, P. (Eds.), *The new institutionalism in organizational analysis*. University of Chicago Press, Chicago, pp. 1-38.
- Edquist, C., 1997. *Systems of innovation: Technologies, institutions and organizations*. Printer, London.
- Edquist, C., 2001. *The systems of innovation approach and innovation policy: An account of the state of the art., the DRUID Conference, Aalborg*.
- Etzkowitz, H., 2002. *The triple helix of university-industry-government: Implications for policy and evaluation*, Working Paper 2002.11. Science Policy Institute.
- Etzkowitz, H., 2003. Innovation in innovation: The triple helix of university-industry-government relations. *Social Science Information* 42, 293-337.
- Etzkowitz, H., 2008. *The triple helix : University-industry-government innovation in action*. Routledge, New York ; London.
- Etzkowitz, H., Leydesdorff, L., 1995. The triple helix---university-industry-government relations: A laboratory for knowledge-based economic development. *EASST Review* 14, 14-19.
- Etzkowitz, H., Leydesdorff, L., 1997. *Universities and the global knowledge economy: A triple helix of university-industry-government relations*. Printer, London.

- Etzkowitz, H., Leydesdorff, L., 2000. The dynamics of innovation: From national systems and "mode 2" to a triple helix of university-industry-government relations. *Research Policy* 29, 109-123.
- Eun, J.-H., Lee, K., Wu, G., 2006. Explaining the "university-run enterprises" in China: A theoretical framework for university-industry relationship in developing countries and its application to China. *Research Policy* 35, 1329-1346.
- Friedland, R., Alford, R.R., 1991. Bringing society back in: Symbols, practices, and institutional contradictions, in: Powell, W.W., DiMaggio, P. (Eds.), *The new institutionalism in organizational analysis*. University of Chicago Press, Chicago, pp. 232-263.
- Gorges, M.J., 2001. New institutionalist explanations for institutional change: A note of caution. *Politics* 21, 137-145.
- Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E.R., Lounsbury, M., 2011. Institutional complexity and organizational responses. *The Academy of Management Annals* 5, 317-371.
- Greenwood, R., Suddaby, R., Hinings, C.R., 2002. Theorizing change: The role of professional associations in the transformation of institutionalized fields. *The Academy of Management Journal* 45, 58-80.
- Jacob, M., Lundqvist, M., Hellsmark, H., 2003. Entrepreneurial transformations in the Swedish university system: The case of chalmers university of technology. *Research Policy* 32, 1555-1568.
- Kostova, T., Zaheer, S., 1999. Organizational legitimacy under conditions of complexity: The case of the multinational enterprise. *Academy of Management Review* 24, 64-81.
- Kumaresan, N., Miyazaki, K., 1999. An integrated network approach to systems of innovation--the case of robotics in japan. *Research Policy* 28, 563-585.
- Lang, X., 2009. *Lang xianping' review: Who kills Chinese economy--the culture curse on Chinese*. Oriental Publisher, Beijing.
- Levine, A., 1980. *Why innovation fails*. State University of New York Press, Albany.
- Leydesdorff, L., 2012. The triple helix, quadruple helix, ..., and an &i&t;n-tuple of helices: Explanatory models for analyzing the knowledge-based economy? *Journal of the Knowledge Economy* 3, 25-35.
- Leydesdorff, L., Etzkowitz, H., 1998. The triple helix as a model for innovation studies. *Science and Public Policy* 25, 195-203.
- Lundvall, B.-Å., 1992. *National systems of innovation : Towards a theory of innovation and interactive learning*. Pinter Publishers, London, New York.
- McPherson, C.M., Sauder, M., 2013. Logics in action: Managing institutional complexity in a drug court. *Administrative Science Quarterly* 58, 165-196.
- Meyer, J.W., Rowan, B., 1977. Institutionalized organizations: Formal structure as myths and ceremony. *American Journal of Sociology* 83, 340-363.
- Meyer, J.W., Rowan, B., 1991. Institutionalized organizations: From structure as myth and ceremony, in: Powell, W.W., Dimaggio, P.J. (Eds.), *The new institutionalism in organizational analysis*. The university of Chicago Press, Chicago and London.
- Meyer, J.W., Scott, W.R., 1983. *Organizational environments: Ritual and rationality*. Sage, Beverly Hills ; London.

- Mowery, D.C., Sampat, B.N., 2004. Universities in national innovation systems, in: Fagerberg, J., Mowery, D.C., Nelson, R.R. (Eds.), *The oxford handbook of innovation*. Oxford University Press, Oxford and New York, pp. 209-239.
- Nelson, R., 1993. *National systems of innovation: A comparative study*. Oxford University Press, Oxford.
- Nonaka, I., Takeuchi, H., 1995. *The knowledge-creating company : How japanese companies create the dynamics of innovation*. Oxford University Press, New York ; Oxford.
- OECD, 1999. *Managing national innovation systems*. OECD, Paris.
- Olsen, J.P., March, J.G., 2004. *The logic of appropriateness*. ARENA Working Papers 2004.
- Parsons, T., 1956. Suggestions for a sociological approach to the theory of organisations. *Administrative Science Quarterly* 1, 63-85.
- Rogers, E.M., 2003. *Diffusion of innovations*, 5th ed. ed. Simon & Schuster, New York, N.Y.
- Saad, M., Zawdie, G., 2011. Introduction to special issue: The emerging role of universities in socio-economic development through knowledge networking. *Science & Public Policy (SPP)* 38, 3-6.
- Saad, M., Zawdie, G., Malairaja, C., 2008. The triple helix strategy for universities in developing countries: The experiences in malaysia and algeria. *Science & Public Policy (SPP)* 35, 431-443.
- Scott, W.R., 1995. *Institutions and organizations*. Sage Publication, Thousand Oaks, California.
- Shinn, T., 2002. The triple helix and new production of knowledge: Prepackaged thinking on science and technology. *Social Studies of Science* 32, 599-614.
- Sotarauta, M., Kosonen, K.-J., 2013. Customized innovation policies and the regions: Digital content services and intelligent machinery in Finland. *European Urban and Regional Studies* 20, 258-274.
- Thornton, P.H., Ocasio, W., 1999. Institutional logics and the historical contingency of power in organizations: Executive succession in the higher education publishing industry, 1958-1990. *American Journal of Sociology* 105, 801-843.
- Thornton, P.H., Ocasio, W., 2008. Institutional logics, in: Greenwood, R., Oliver, C., Sahlin, K., Suddaby, R. (Eds.), *The sage handbook of organizational institutionalism*. SAGE, Los Angeles ; London, pp. 99-129.
- Thornton, P.H., Ocasio, W., Lounsbury, M., 2012. *The institutional logics perspective : A new approach to culture, structure and process*. Oxford University Press, Oxford.
- Triple Helix Conference Website, 2011. *The triple helix concept*.
- Tuunainen, J., 2002. Reconsidering the mode 2 and the triple helix: A critical comment based on a case study. *Science Studies* 15, 36-58.
- Whetten, D.A., 2009. An examination of the interface between context and theory applied to the study of Chinese organizations. *Management and Organization Review* 5, 29-55.
- Viale, R., Pozzali, A., 2010. Complex adaptive systems and the evolutionary triple helix. *Critical Sociology* 36, 575-594.
- Williams, L., Woodson, T., 2012. The future of innovation studies in less economically developed countries. *Minerva: A Review of Science, Learning & Policy* 50, 221-237.

Yang, J., 2005. Knowledge integration and innovation: Securing new product advantage in high technology industry. *The Journal of High Technology Management Research* 16, 121-135.

Zawislak, P.A., Dalmarco, G., 2011. The silent run: New issues and outcomes for university-industry relations in brazil. *Journal of Technology Management & Innovation* 6, 66-82.

Zhou, C., Peng, X.-m., 2008. The entrepreneurial university in China: Nonlinear paths. *Science & Public Policy (SPP)* 35, 637-646.

Zucker, L.G., 1977. The role of institutionalization in cultural persistence. *American Sociological Review* 42, 726-743.