

Challenges to the Transformational Role of University in Regional Innovation System

Abstract: A review of literature recognizes that universities play an important role towards regional innovation system and the innovation systems in China differ from the one in advanced marketing economies. Over the past decade, some university mergers took place in mainland China from which more comprehensive universities emerged. The changes from the mergers are not only in sizes and subject fields, but also in governance, research foci, and relationships with local firms. This situation, coupled with the complexity of national and regional economic transitions, calls for an appraisal of the transformational role of universities in regional innovation systems in order to outline some best practices and identify challenges for future development. A case study of Zhengzhou University in China is adopted for a preliminary study. The research outcome of this case study can be generalized to other regional innovation development whose economic contexts share similarities with this case.

1. Introduction

Universities in industrialized countries have transformed their traditional role of teaching and research into actively participating in regional economic development since 1980s (Mian 1997). Although universities are recognized as one of the three important players in regional innovation systems, namely universities, governments and industries (Etzkowitz 2003, Looy et al 2003, Gunasekara 2006), most studies didn't take into account the fact that the roles universities undertake in society can change and evolve over time, and the transformation of the university can influence regional economic development and innovation system (Youtie & Shapira, 2008).

Liu and White (2001) point out that research on national innovation system has been subject to criticism. Innovation performance varies at sub-national level within a national boundary (Fritsch 2002). For large countries like China, the regional innovation systems vary at province level due to imbalance of regional economic development, coupled with regional and industrial diversity in economic transition (Li 2009). Based on measurement of institutional patents, Li (2009) found that during 1998 -2005, the performances of regional innovation in China became 'progressively uneven' (p339), and the variations were related to the difference in innovation modes adopted by different regions. Meanwhile, the contributions of universities towards regional innovation system differ across regions as some regional innovation systems have changed from university dominant mode to a firm dominant mode. In addition, the conceptual frameworks established in developed economies (see Furman et al. 2002) are not fully applicable to developing economies like China, because of the transitional nature of the economic conditions (Li 2009), and the differences in the economic and social development policies at provincial level (Liu and White 2001). The regional social features, such as local culture, dialect and traditions, also influence evolutionary processes in regional innovation (Li 2009). These elements altogether increase the complexity of the regional innovation systems in China.

The higher education restructuring along with university mergers in China started since mid-1990s (Mok, 2005) in response to the requirements of the economic

changes and development. The education reforms in China's higher education are featured with devolution of management from central government ministries, such as Ministry of Coal Industry, Ministry of Internal Trade, to provincial or municipal governments. As a result, only 111 universities out of about 1,400 higher education institutions are supervised by Ministry of Education, and the rest are financed and supervised by provincial governments with a comprehensive funding formula for budgeting. Most higher education institutions also generate incomes by engaging in entrepreneurial activities (Wan 2006). The changes have caused fundamental impacts on the universities' research foci, their relationships with local firms, and their relationships with local governments in managing universities, which consequently influence universities' role and some of the institutions in regional innovation systems.

As universities are one of three components in regional innovation system, the need for investigating its impacts and implications after restructuring in the transitional economic context is evident. So far, however, there has been very little investigation on the universities' transformational role during the economic transition in their regional contexts, and the impacts of the mergers of education institutions and education reforms in connection with regional education systems. Through the use of an in-depth case study approach, this paper examines the role of Zhengzhou university within its regional innovation system in order to identify the key issues and challenges for a sustainable regional innovation system.

2. Universities in regional innovation systems

2.1 Defining regions in RIS

According to Doloreux & Parto (2005), the concept of regional innovation systems can be traced to two main disciplines in research. The first one is systems of innovation which conceptualize innovation processes (e.g. main elements in the process and how the performance of this process can be improved). The second discipline is regional study, which is concerned with the social context of the innovation, as the factors and actors in the social context could influence the process of innovation. Not only does the innovation process require localized resources such as skilled labour and research outputs, but also it is shaped by institutionalized values and procedures at regional level. The proximity of regional actors, such as firms and research institutions, is vital for collective learning, knowledge sharing, and stimulating innovation, and there is empirical evidence that these activities are highly localized (Maskell & Malmberg 1999).

It is increasingly accepted that important elements in the innovation process should become regionalized (Doloreux & Parto 2005). The rationale for studying innovation systems at regional level stems from the following two aspects:

1. Consideration on contextual elements, such as the influences from the institutional, political and social contexts.
2. Adoption of a network perspective, as all firms are embedded in their business networks, their business activities including innovation, are influenced by their networks. The regional context defines the shared values, norms and

conventions which have substantial impacts on trust and proximity (Doloreux & Parto 2005).

The regional innovation system approach recognizes the institutional nature of the innovation process. However, this approach has been criticized for lack of clear definition or conceptualization on the key elements of this approach. While some argue that the scale of regions vary in different studies (Cooke 2001), others see a regional innovation system as simply a subset of a national system (Archibugi et al. 1999). In the globalized economy, regional innovation system must stay integrated with other regions and systems in order to achieve its competitive advantages (Asheim & Gertler 2004). Cooke and Morgan (1998) argue that regions, no matter how defined, have some kind of innovation system. This explains why they assert that only three regions are true regional innovation systems: Silicon Valley, Emilia-Romagna, and Baden-Württemberg.

This study recognizes regions as a geographically defined place which can be distinguished from surrounding areas, with internal coherence between firms which are interconnected and interdependent (Cooke & Schienstock 2000, Cooke 2001). The provincial boundary, which fits this definition, is adopted to define a region and consequently the concept of regional innovation system.

2.2 University in Regional Innovation System

Universities and industries collaborate for mutual benefits that also generate opportunities for innovation. Bercovitz and Feldman (2006) provided a conceptual framework to analyze the university–industry relationships (Figure 1). The framework consisted of transactions at the core of the university–industry relationships, an individual researcher, firm characteristics, and university technology transfer strategy and structure. They suggested that the legal, economic, and policy environments that comprise the system of innovation determine the rate and type of university knowledge production and thereby influence the rate of technological change. It is clear from the framework that university–industry collaboration promotes mutual knowledge exchange which forms the basis for new innovations. Empirical investigations suggest that the lack of collaboration between universities and industry has been identified as the main reason for European’s ‘innovation deficit’, comparing with the innovation related performance in USA and Japan. (Tijssen and Van Wijk 1999, Debackere et al., 1999, Porter 2011). Although Europe is active in scientific research, the commercialization of the research output needs further improvement to contribute to the regional innovation system (Debackere et al., 1999).

The importance of the knowledge centers, normally comprising universities and research institutions, can also be attributed to the embeddedness of these knowledge centers at regional and supra-regional levels (Looy et al. 2003). The main functions of the knowledge centers in regional innovation process are knowledge creation and dissemination, which place the knowledge centers ‘in a central place and a fundamental role in any regional innovation network (Looy et al. 2003, p 225) to provide timely support for knowledge development. A range of mechanisms can be adopted for the knowledge centers actively contributing to regional innovation as illustrated in Table 1.

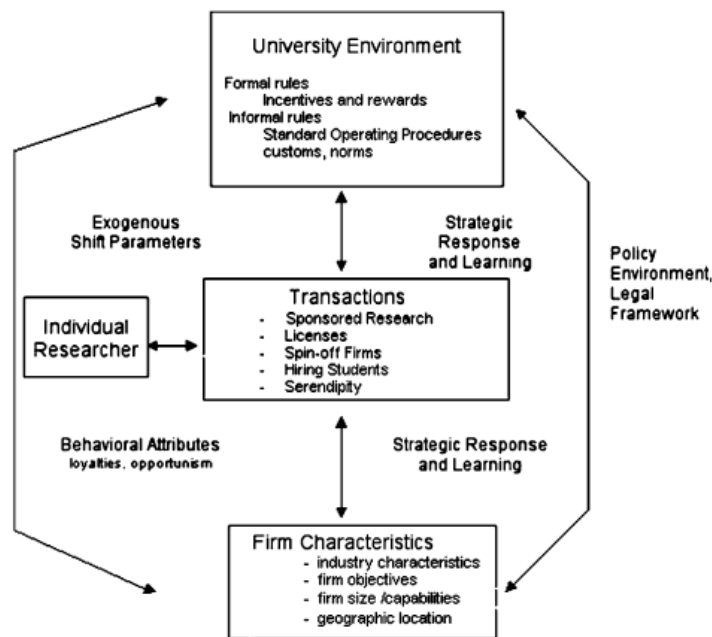


Figure 1: University-industry relationship evolutionary schema

(Source: Bercovitz and Feldmann, 2006)

	Emphasis on local development and embeddedness	Emphasis on supra-regional development and embeddedness
Structural arrangements	Incubators Research parks Spin-offs Education and training	R&D collaborations Affiliation programmes Licenses Consortiums
Non-structural arrangements	Labour markets for researchers and technologists Seminars Professional associations Local networking	Consulting and professional advice Publications Seminars Professional associations International networking

Table 1 Knowledge centers and supra-regional dynamics (Looy et al. 2003, p225)

Etzkowitz (2003) advocates that the interactions between university, industry and government are the key to improve the conditions for innovations. These interactions can be captured in a Triple Helix model (Figure 2). In this Triple Helix approach, university is considered as a source of new knowledge and technology, while government is to set out the policies and procedures for interactions and exchange, and industry as locus of production. This model elevated university from a peripheral position to an equivalent status as of government and industry for three reasons. First of all, most of the universities have transformed their role from teaching institution into one focusing on teaching as well as research. Secondly, intellectual capital generated from research is as important as of financial capital in economic development. The elevated position of university is also reflected in the regional innovation system where the study was conducted. The function of the firms and universities in China's regional innovation system were restricted to certain scope

under its past central planning system, which consequently limited the incentives and contributions for these players on innovation (Liu & White, 2001). Meanwhile, government and local authorities had leading role in the regional innovation system. However, the core competency of the university has shifted from the production of human capital and knowledge into the diffusion of intellectual property, with the support of recombining and enhancing internal and external innovations (Etzkowitz, 2003).

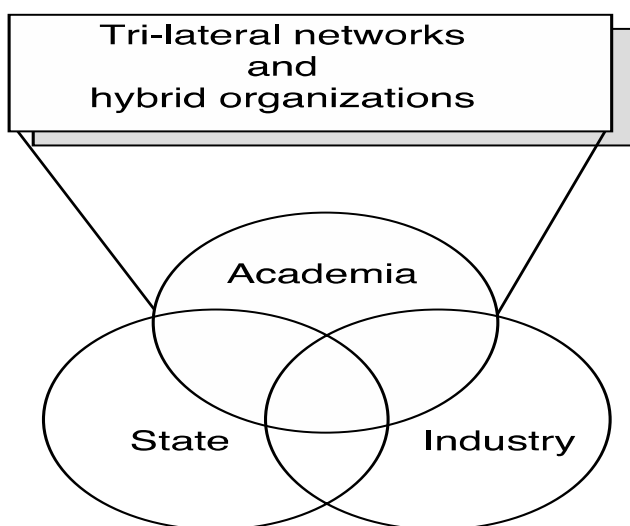


Figure 2, Academia in the Triple Helix (Etzkowitz 2003, p302)

Similarly, Looy et al. (2003) consider that a critical factor for the success of regional innovation system is the access to knowledge centres, where crucial knowledge for innovation is produced, as empirical studies have suggested a clear correlation between the education institutions and the technology-output in regional innovations (Blind and Grupp 1999). Porter (2011) points out that the entrepreneurial character displayed by universities are crucial to make positive impacts on region's performance in terms of innovation, as the entrepreneurial character enables the university to engage in activities to translate research output into business practices.

Entrepreneurial character of university can be traced by the feature on how research problems are generated and defined by both internal and external sources, and more importantly, by the interactions between university researchers and external sources. However, it should be noted that the university and industry are related by a range of factors in the Triple Helix model, which is reflected in the co-evolution of university-industry relations in Figure 3 (Etzkowitz, 2003).

The 'triple helix' model identifies the three main actors in regional innovation system and explains how the dynamics of their interactions influence knowledge production and utilization. The notion of co-evolution of the actors highlights the fact on how the various actors, with distinguished role and competencies, influence one another along the innovation value chain (Looy et al. 2003). The contribution of the university in regional innovation and economic development has been defined as the third role of university, following their roles in teaching and research (Gunasekara 2006).

	firms near the University.	formation projects.
Human capital formation	<ul style="list-style-type: none"> • Integration of education and knowledge capitalisation activities, specifically, firm formation, through teaching incubators. • Development of generic, advanced training programs to support firm formation and cross- institutional mobility by organisations and people 	<ul style="list-style-type: none"> • Stronger regional focus on student recruitment and graduate retention. • Education programs developed/adapted to meet regional skills needs. • Learning processes regionally
Associative governance	<ul style="list-style-type: none"> • Driver of regional innovation strategy, centred on knowledge capitalisation and capital formation projects; by analysing strengths and weaknesses and bringing together industry and government to forge innovation strategy. 	<ul style="list-style-type: none"> • Shaping regional networking and institutional capacity, through staff participation on external bodies; provision of information and analysis to support decision-making and brokering networking between national and international contacts and key regional actors.
Regional cultural norms	<ul style="list-style-type: none"> • Tradition of university/industry linkages, involving knowledge capitalisation. 	<ul style="list-style-type: none"> • Tradition of university/industry linkages, involving knowledge capitalisation and other research collaborations

For Gunasekara (2006), the variation of the roles a university performs in regional innovation can be measured from the following aspects:

1, University orientation to regional engagement, which is defined as nature of senior management commitment to regional engagement and mechanisms through which this is operationalised.

2, History of university-region linkages, which is defined as nature of historical linkages between a university and regional actors.

3, Champions which means the presence and influence of university and regional advocates of university- region/industry linkages.

4, Nature of regional industry base, which is the types of industries and businesses in a region, and their demand for university knowledge linkages.

5, Political and economic conditions, implies the influence of specific government policies and/or practices directed to the region and the university. Influence of specific economic conditions in the region. (p9)

In summary, the role of university in regional innovation system is pivotal, although the role university performs, varies from one region to another. The role university performs in regional innovation system can be more complicated in the context of China's economic transition, along with education reform and university

restructuring. An empirical investigation of universities' role in China regional innovation system has become imperative in order to develop a more comprehensive model to measure universities' contribution in China's regional innovation systems.

3. Chinese Universities in regional development context

The Chinese higher education system underwent a reorganization in 1990s which is featured with mergers. During the period from 1998 to 2005, there had been 424 mergers between universities in China. Among these mergers, 40 mergers were completed during the period from 1999 to 2001. This has led to , the restructuring of 104 higher education institutions into 40 institutions which has effected all types of education institutions ranging from prestigious university to small local colleges (Wan 2006).

As discussed in section two, economic activities are increasingly dependent on regionalization, which refers to the resources specific to individual places (Storper 1997). The advocates of regional innovation studies argue that innovation activities differ across regions. Regional innovation systems are an adequate approach for analyzing innovation activities (Fritsch 2002), although there are still ambiguities in defining the boundaries of regions. In the knowledge economy era, universities are considered as key players in regional development due to their capacity in knowledge creation, dissemination and contribution to innovations. In addition, the uncertainty and complexity in transferring tacit knowledge require spatial proximity to facilitate interactive learning and knowledge flow within regional boundaries.

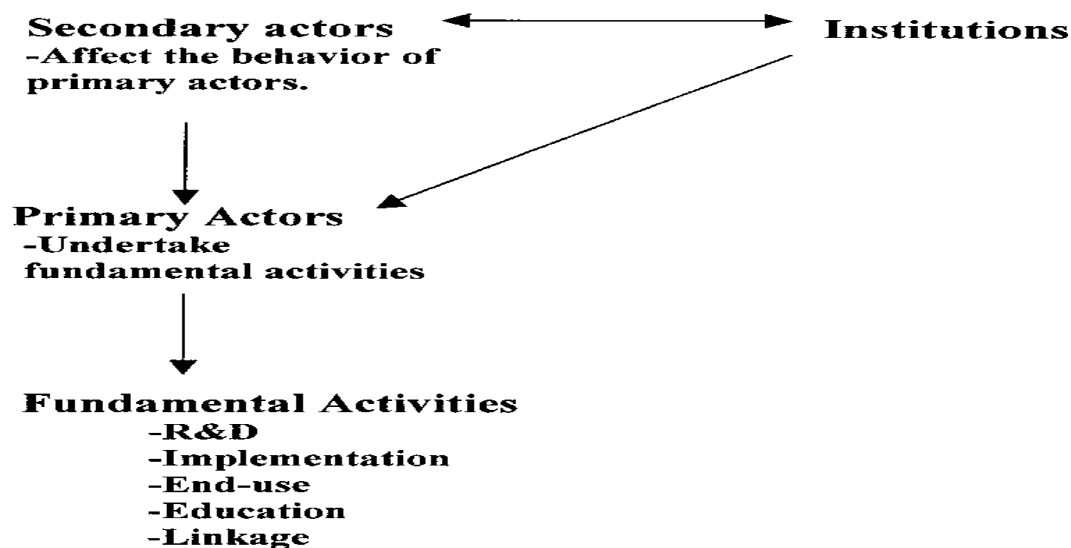


Figure 4: Elements of generic framework for analyzing innovation systems
(Liu and White, 2001, p1094)

3.1 China's regional innovation system in transition

Nelson (1993) points out that the innovation systems in China and ex-Soviet Union can be significantly different from those of other countries', because of the characters of their economic principles and industrial organizations, e.g. the role of State-

Owned-Enterprises and some impacts of central planned economies. In recognition that the organization and distribution of innovation processes in the large, formally central planned economies differ fundamentally from those in the developed market economies (Liu and White 2001). Liu and White (2001) examined the evolvments in China's innovation systems through economic transition and proposed a framework to measure these changes. Their empirical study provided insightful analysis on how the innovation system in China evolved under the impacts of China's economic transitions. The framework they proposed comprises of the actors (primary actors and secondary actors) and activities (R&D, Implementation, End-use, Education, Linkage) in the innovation system.

Liu and White (2001) argue that evaluating innovation system at national level is still valuable. However, the variations of the innovation systems at regional level in China were not considered in their study, on the assumption that the aggregated regional innovation systems at national level manifest the features of regional systems. Also the impacts of China's education reform and the evolving role of the university in regional innovation systems were not taken into account.

Li (2009) points out that *'one of the most noteworthy features of transitional Chinese innovation systems is an increasing variation in regional innovation performance'* (p341). For instance, by 2005 over two thirds of the total invention applications came from the five most innovative regions in China. This further justifies the adoption of region rather than nation as the scope for studying innovation system in China. As the significance of local and regional factors has increased in innovation processes and in economic development (Tödtling 1994), a study of innovation system at regional level in China can yield more meaningful insight, especially for those economies differ from developed market economies.

In his empirical study, Li (2009) recommend to adopt province as the boundary for research in regional innovation systems in China. Not only because provincial governments have gained autonomy for formulating economic and social development policies since China's open door policy (Liu and White, 2001), but also because of the variations in governance and culture, which comprise of dialect, customs, and traditions, are highly regionalized at provincial level. The "coherence" and "inward orientation" at the provincial level are the main rationale for considering regions as relatively independent innovation system. As one of the consequences, technology policies and innovation plans display significant regional features, as tacit knowledge and social capital are closely related to regions, which are only accessible within a particular region (Li 2009).

Li (2009) also recommends taking into account the other three features in studying China's regional innovation system:

- 1, A big leap in innovation development during late 1990s and the early 21st century, reflected in a significant increase in R&D and innovation activities.
- 2, Many organizations have been involved into innovation and R&D performance in the regions in economic transition, with universities and research institutions taking the leading role in innovation activities, despite the fact that business firms are expected to take over the leading role in the future.

3, The co-existing of dual innovation systems, which are featured with an upper level innovation system to catch up with their counterparts in advanced economies, and a lower level innovation system to meet the requirements of regional development. It should be noted that the lower level innovation system, which roots in locally embedded industries, is more important for local economic development (Li 2009).

In the economic transition, China's central government also endeavors to make use of resources from universities in promoting China's economic and social progress. A programme known as "Project 211" was launched in late 1995, which was supported by the ministries of education and finance, and the State Development Planning Commission. The project costs US\$1.57 billion, and has been the largest of its kind related to HEIs since the founding of the People's Republic of China in 1949. It is accepted that this programme has stepped up universities' contribution to local economic sectors and promoted information and technology sharing among universities and industrial practitioners (Liu & Jiang 2001), although the effective contributions from universities are still constrained by barriers between universities and industrial practitioners (Li & Hu 1998). A study to facilitate universities' contribution in the economic transition has become imperative.

3.2 Higher education reorganization in China

Traditionally, universities are considered in a peripheral position in innovation, which has been transformed to a central one in recent years, as the knowledge creation and utilization performed by research institutions are more closely involved in industrial production and governance in order to implement the knowledge and techniques into practice. This transformation is in parallel with the transformation of innovation from within firms' boundaries to one that take place among firms and research institutions (Etzkowitz 2003). In order to achieve sustained growth through production of ideas and intellectual property for China's economic development, the transformation in China's higher education sector started in 1980s (Mok 2012), this transformation focuses on marketization of the higher education, organizational reforms of the universities, and introducing internationalization in higher education (Mok 2012, Li et al. 2011).

Decentralization and marketization are two major strategies for China's economic reform since 1970s, which were also applied to the management in public sector as well as education sector aiming to improve the efficiency, effectiveness, and flexibility. The universities in China have not been fully state-funded since then.

Not only did the funding become diversified, but also more approaches were adopted in order to improve the quality and quantity of higher education. For instance, private colleges established by entrepreneurs and international education programmers delivered by western education institutions have not been prohibited any more since late 1990s. The privatization process of the higher education in China was accelerated as result of China's WTO membership, which recognizes higher education as a private good (Mok 2009, Mok 2012). As higher education has distanced itself from the socialism welfare system. Profit marking is now an important part of measurement for the performance of the education institutions, as the survival of these institutions is dependent on their own revenues rather than the state's funds. The number of undergraduate and graduate students in China has been growing at

approximately 30% per year since 1999, and the number of graduates at all levels of higher education in China approximately quadrupled between 2002 and 2008. Not surprisingly, the higher education transformation, along with other economic transformations in China, is considered as a mechanism for maintaining economic growth for skill upgrading and raising total factor productivity (Li et al. 2011).

In the transformation process, the focus of the education system has shifted from quantity to quality, as one of the main aims of the education reform was to promote universities performance and improve their overall world ranking. A special '985' programme was launched in 1998 for quality improvement among the top 10 universities in China, with allocated grants for more than 30 billion RMB over three years. The second phase of the '985' programme started in 2004, and the grants were provided to 30 universities for quality improvement. Although the consolidation and restructuring between universities started in 1990, 60% of the reorganization took place between 1999 and 2006 (Mok 2009, Li et al. 2011). In the consolidation process, some universities became faculties of the newly consolidated entity, which resulted to increases not only in students number, but also in the research outputs. For instance, China's share of Asian science and engineering publications increased to 22.43% in 2003 (Li et al. 2011). Furthermore, higher education institutions are more actively engaged in commercial activities through their spin-off enterprises. For instance, the total revenue of all university-owned commercial increased from 31.2 billion RMB, to 96.93 billion RMB in 2004 (Li et al. 2005), and some educational funds are provided to overseas Chinese researchers to return to Chinese universities, often in conjunction with commercial activities (Li et al. 2011). Therefore, the impacts of the education restructuring on regional economic development is evident.

4. Research design

Drawing on the models of innovation system components (Liu and White 2001), university-industry collaboration (Bercovitz and Feldman, 2006), and universities' role in regional innovation (Gunasekara 2006) a case study approach has been adopted. Zhengzhou University has been identified for this case study, the rationale is three-folds.

Firstly Zhengzhou University was created by merging the former Zhengzhou University, Zhengzhou University of Technology, and Henan Medical University in 2000. Co-sponsored by the Henan Provincial Government and the Ministry of Education, Zhengzhou University not only is one of China's National "211 Project" key universities, but also is supported by "The Midwest Universities Comprehensive Strength Promotion Project" (Zhengzhou University 2014). With its exposure to the national and regional supporting policies, the impacts on the regional innovation system can be studied in relation to the roles and activities this university undertook in regional development.

Secondly, with 46 faculties and 9 affiliated hospitals, Zhengzhou University owns more than 310 scientific research institutions across a range of disciplines, indicating a strong capability on research, innovation, application and development of science and technology (Zhengzhou University, 2014). A preliminary screening indicates that this university has been actively engaged in regional innovation activities including its

own companies, hospitals, strategic cooperative frameworks with local councils in Henan province.

Finally, Zhengzhou University is located in Zhengzhou, the provincial capital of Henan. With more than 100 million permanent residents, Henan was featured with large rural area and less developed economy concentrating on agricultures in the beginning of the China's economic reform (China Daily, 2010). During the China's economic reform, Henan, located in the center of China, transformed its agricultural oriented economy to a more balanced economic structure. The regional economic transition shares features of the transition at national level, which will be elaborated in the final empirical study.

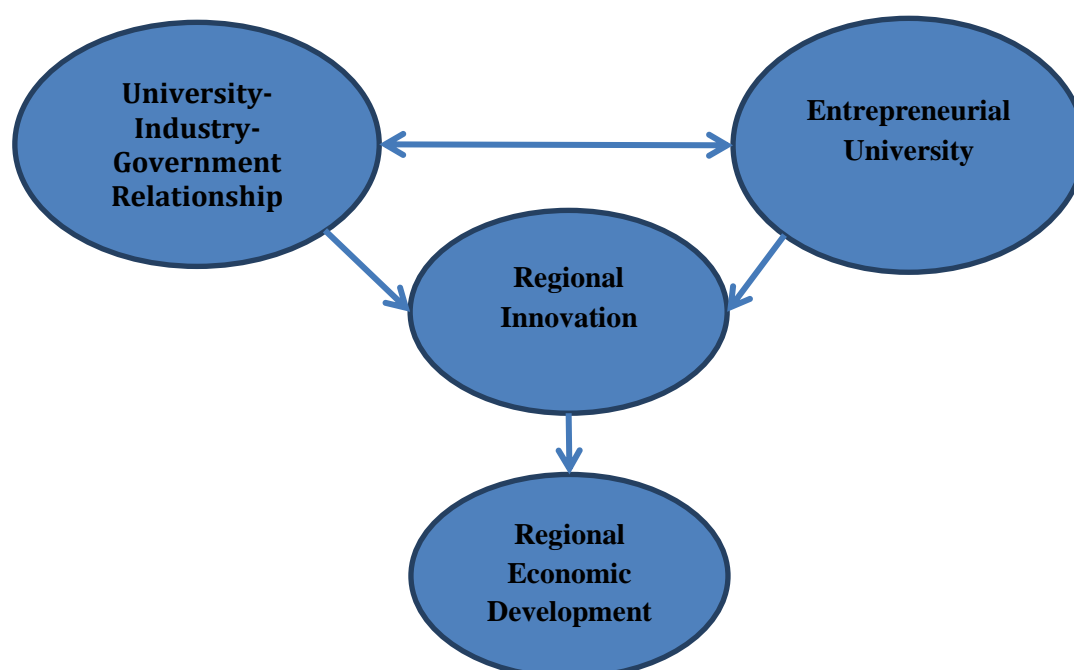


Figure 5: Proposed Research Framework

The roles Zhengzhou university play in the regional innovation system will be studied following the research framework presented in figure 5; a comparison of its roles before and after mergers will be done with the two models developed by Liu and White (2001) and Gunasekara (2006).

The case study started with archive research in order to understand how the university has been involved in regional development and what policies and contextual elements should be taken into account. Three semi-structured interviews were carried out after initial archive research, and further archive research was followed after the interviews. All the archives are in Chinese and the interviews were conducted in Chinese mandarin which is the official language in China. As one of the authors is a native Chinese speaker, the author translated the interview questions into Chinese and transcribed the interviews back to English.

The three semi-structured interviews used different questions for three individuals all worked for the university more than 20 years. The first interviewee has worked in positions on university innovation and cooperation, with sound understanding of the policies, activities and contextual constraints, the name is replaced as interviewee A. This interviewee also provided some constructive comments on how the questions should be formulated and where to find relevant documents and policies. The second one, known as interviewee B in this study, has been extensively involved in managing a university owned enterprise while remains active in teaching and research. And interviewee C, has been providing consultancy services to industry for more than 15 years, who also act as a board member of local company which listed in stock exchange market, the interviewee C has personal experiences on how the policies and restructuring impacted on their involvement in university-firm co-operations.

5. Preliminary data analysis

The following themes emerged from the qualitative data analysis.

1, Institutional development

Since the creation of the new Zhengzhou University in 2000, there have been some significant developments in institutions which support the cooperation between universities and regional innovation. However, most of the institutional development is reflected in local economic policies rather than legislations.

Some policies from provincial authorities and local council did promote the importance of the university's role in regional innovation and economic development. For instance, a policy for promoting higher education's role in regional economy was issued in 2009. It has helped to highlight how higher education sector could support local economic transformation (Henan Government, 2009). More recently, a conference on Cooperative Innovation, chaired by the provincial governor, further confirmed the importance of the higher education sector in regional economic innovation, and development, with new policies to ensure that further involvement from higher education is promoted (Xie, 2014). As interviewee C suggested:

'At times the companies require our expertise to support their strategic decisions. In the past we provided consultancy services and helped local companies with our expertise, without clear institutional support. With more policies issued at provincial and local council levels we can now act with a general framework to support their commercial development, without concerning any potential issues which may endanger our career'

However, it is noted that the institutional development reflected in legislation is lagging behind. Interview B illustrated the lack of clear legislation in university-owned enterprises:

'with the encouragement of the national and local policies, some new university-own enterprises were created and developed. Of course the university keeps the best performance enterprises. However, for some

enterprises which haven't been performing well, it is not clear how to transfer the ownership to private company or individuals'

The interviewee further added:

'of course the private company or individual wouldn't like to pay too much to take over a company which cannot make good profit. However, the initial investment from the university should be normally recovered from such a transaction. It is difficult and the one who decide to sell the company to private company without recovering the initial investment from the university, may be blamed for corruption and be investigated. It is really a difficult situation as the university didn't want to invest more into this kind of enterprises and nobody would like to take responsibilities for new solutions.'

It has been reported that a Pro vice chancellor, who resigned and bought an university-own enterprise when the company run into trouble and turned it into a successful business after several years, has been arrested for buying university-owned enterprise with under-valued estimate (Li 2014). Although there was clear evidence that the company was in extremely difficult situation with fierce competition when it was sold, and the company director, worked as Pro vice chancellor for that university, was sentenced (Li 2014).

Interviewee B commented on this report:

'the impact of this arrest was profound. it is understandable that people who buy this kind enterprises would like to turn them into successful business. Without clear institutional support, people would be afraid to take over the university-owned enterprise in the future, which leaves the financial burden to the university.'

Due to the fast economic development and transition, some institutional support has been provided in order to promote regional innovation and economic development. However, it is evident that more institutions at operational level should be developed.

2, Contribution to regional innovation and economy

It is evident that higher education's role in the regional innovation and economic development has evolved following the economic development and transition. As observed by the interviewee A

'Before the educational restructuring, universities received sufficient funding from government and the incomes from university-own enterprises were marginal. In addition, not so many academics would like to get involved in university-own enterprises, as the career path and rewarding structure were not clearly defined. The governance of the university along with its enterprises are now more open and flexible, which encourage academics to get involved in not only the university-own enterprises, but also the co-operations between university and local businesses'

Interviewee B commented on the social image between academics and business people

‘In the past working in higher education was a highly respected profession, while working in business wasn’t. The image of business people has evolved in the past two decades, and both of the professions are now respectful.’

The new campus of Zhengzhou University is located in Zhengzhou Innovation and Development Area, along with another 3 universities, 25 Research and Development centres and institutions specializing in engineering, materials and technologies. These universities and the research centers have formulated strong ties for co-operations and innovations (Chinese Economy, 2006). The university has become a primary player in regional innovation and economic development. Interviewee A outlined the reasons for the change.

‘In the fast economic transition, the university has been considered as a knowledge hub which can serve the society when people couldn’t find solution from somewhere else. We have experts in government policies and legislations, experts in engineering, mass communication, agriculture etc. ‘we have established our image as a reliable partner for businesses, for instance, our architecture design center has generated 230 million Yuan turnover in 2014 alone.

The university has also signed strategic agreement with some local councils, municipal departments to assist development in different aspects with their expertise. And the conference chaired by provincial governor in 2014 further emphasized the importance of the universities in regional innovation and economic development. With 25 Cooperative Innovation centers at provincial level and one at national level, the Cooperative Centres, managed by different university departments to benefit from their expertise, have been considered as a strong engine for regional innovation and development (Xie 2014).

With the strong ties with both governments and companies, universities in Henan province has evolved from secondary player to a primary player due to their profound involvement and contribution to regional innovation and economic development.

3, University Governance

Although the involvement and co-operations with local business development have been encouraged at strategic level, it is argued that the university governance doesn’t fully recognize the requirements from a range of entrepreneurship activities. Interviewee B criticized the governance lacks of flexibility

‘I started taking a managerial role in an university-own enterprise while I was an associate professor. Although I have made the business successful with my expertise and reputation in this industry, it wasn’t possible for me to be either promoted to Professor or Director, as my working time is split between the two activities. I had to supervise PhD and masters students while teaching undergraduate students, along with running the business with my engineering expertise. I have more than one line managers to evaluate my performance with different requirements for promotion.’

Interviewee B was forced to suspend his managerial role in that enterprise in order to conduct research for his professorship, while in fact his management activity could be used for his research publications as he worked as a specialist chief engineer in that enterprise.

‘it looks simple but some individual cases have to be put into the overall governance context which makes things complicated, the university has clear policy and structure for those working both in medical school and in university-own hospital, but not for engineering and business disciplines. ’

Also some special courses, such as EMBA, functioned as special platform for promoting regional economy but is not fully recognized by the formal structure.

‘The students on the Executive MBA course are successful entrepreneurs and government officials, their practical experiences are supported by the theoretical development in business management on the course. More importantly, the students have very sound understanding on how to follow the economic development policies to achieve better outcome with less risks. Some students already set new business ventures with their peers after they finished their study here. Also the alumni could be better managed to reflect their needs for collaboration’

Interviewee A also expressed some of the concerns in regard of the governance:

‘With 9 hospitals and some engineering enterprises, and consultancy services to local authorities and companies, it is clear that the university is in a centre of a conglomerate. However, it should be recognized that running an institution with some many collaborations with regional innovation agencies requires some subtle design in governance to reflect the needs of the new development. Some innovative initiatives were very good but also very bold if measured by existing governance system. ,for this kind of initiatives it wasn’t clear who should take the lead and which department or person has got the ultimate authority to evaluate and approve it. Sometimes people feel powerless when they have to follow the bureaucratic processes for innovative initiatives, which didn’t consider the constraints of the current governance system.’

Although Interviewee A criticized the bureaucratic processes, interviewee B, argued sometimes there were no clear processes at all to follow in order to innovative initiative through the system

The university has to accept that each department has got some special requirements due to the fast development, and lots of decisions are made at directors’ discretion on ad hoc basis rather than reflect the different requirements in a well-designed governance. When too many decisions are made on ad hoc basis it is really time consuming and no had clear route to follow.

And interviewee C noted the following:

'In current business environment the ties between government and companies can be easily linked to the speculation of corruption, university not only provides expertise but also mediate the requirements from both sides. However, this role and function is not really reflected in our governance, and sometimes it is really difficult and slow to get the three-party collaboration through. However, some collaboration were impossible without university involvement '

Clearly the governance is another challenge for future development, especially for the innovative initiatives.

6. Concluding remarks

Due to the dynamic interactions between the actors in regional innovation systems, the boundaries of the actors are not clearly defined as they may undertake each other's roles in a specific innovation system. With distinctive features in the economic development, the regional innovation systems in China differ from those of advanced market economies. Universities in China, as one of the main contributors in regional innovation systems, have been exposed to regional and national economic transition, and education reforms. Our preliminary findings based on qualitative data have confirmed that university's contribution towards regional innovation system has evolved from secondary to primary player, with strong ties with both governments and firms. It is evident that during the transitions from central planning to greater market coordination and de- centralized decision-making, the university could take the boundary spanning role to promote collaborations between government, firms and research institutions. As evidenced above, the university has acted in multiple roles as consultant to government and companies, as research center, as education and training provider, and as entrepreneurship hub and company owner. The multiple roles of the university enables the university not only connects with more players in the regional system, but also stay in a central position in the network to facilitate regional innovation. It was found that in this case the ties between governments and firms were relatively weak comparing with the ties with university. This has put university into a more unique and prominent position. We argue that the current frameworks don't fully recognize the role and functions that universities perform in regional innovation system. Hence, more data is needed to develop a comprehensive framework capturing the dynamics between the players and some key elements in the business environment. Future research needs to investigate the proposed framework using the quantitative data. As Chinese regional innovation systems *share several prominent features that are typically found in developing or transitional countries* (Li, 2009 p340). The preliminary outcomes can be generalized to other similar regional innovation systems in these developing or transitional countries.

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