

## Conceptualizing the Engagement of Universities in Regional Development in a Knowledge-based Society

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**Abstract** : Following the emergence of a knowledge-based economy, the role of universities in regional development has been re-evaluated through considering localized interactive learning processes. This paper tries to identify the role of universities for regional development and the variables effecting on their localized engagement in regional development. We argues that universities cannot be viewed as a single angle, because the behaviors of a university are influenced by the degree of their independence from regional and national governments. Likewise, the contributions of universities to their regional development can be differential depending on the organizational characteristics of individual universities, the social, political, and economical contexts of a given region and nation, and complex relations between and within universities and other regional stakeholders. These variables can be both the drivers and barriers when each university responds to regional needs. Based on the literature review, we suggest that the explanatory factors of shaping the engagement of universities in regional development can be classified into four categories: the characteristics of individual universities, the national context, the local and regional context, and the policy context.

**Keywords** : the role of university in regional development, regional innovation, localized process of learning, an evolutionary perspective

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### 1. Introduction

There is a growing importance attached to the role of universities at a regional level, with some notable examples in which regions and their universities have successfully constructed

innovative learning process, such as in Santa Clara County, California so called Silicon Valley and Stanford University; in and around Boston called Route 128 and MIT (Massachusetts Institute of Technology); and Cambridge University and its region (Kitagawa, 2004). In general, with the

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knowledge-based economy, the role of universities in their territorial development has been re-evaluated through considering localized interactive learning processes. Furthermore, the concept of regional innovation system is widely used with the role of universities.

However, even though there is a considerable amount of accumulated knowledge in these issues, there is a lack of a critical perspective. Most of the work is focused on the normative role of universities' engagement in their communities (Chartterton & Goddard, 2000; Lundvall, 2002; Sutz, 1997) rather than critically examining what kind of contexts influence on universities' engagement. It cannot be said that universities in all regions actively engage in their regional matters. In reality, it seems that there is a gap between the conceptual and normative model of universities' role and the actual engagement of universities in regional development (Kitagawa, 2004). The universities' engagement in their regional development is uneven, and mediated by several obstacles such as the degree of regional development and the changes in policy directions (Gunasakera, 2006). Therefore, it is timely to problematize the relationship between universities and territorial development, because this relationship is viewed as particularly essential context in explaining regional development.

With the above critical perspective, this paper attempts to bring together the diverse concerns of territorial development and the role of universities and to discuss the nature of universities engaging in regional development. It begins with theoretical issues backing up the recent role of universities in regional development, such as the evolutionary process inside the region and the advantage of the

localized learning process. In the first part of the paper, it discusses the theoretical background of why universities are importantly considered in these days with relations to regional development. Some different explanations can be possible, but this article deals with the evolutionary economics, which is widely accepted by many academia discussing territorial development and innovation. This is followed, in the second part, by a critical review of literature explaining an engagement of universities with classification into two groups, and this part also generates some questions. The third part presents a critical discussion of the literature on the changing role of universities, and explores the explanatory factors shaping universities' engagement in regional development.

## **2. An evolutionary perspective on regional development: some key concepts**

### **1) Institutions**

During the last two decades, given the prevailing emphasis on globalisation and the renewed concern with regions, the matter of regional economic development has been increasingly discussed with learning and innovation processes focusing on social and institutional conditions within regions (Cooke, 1998; Lundvall, 1992). A number of concepts based on learning, innovation and institutions such as 'learning region' (Morgan, 1998) 'regional innovation system' (Cooke, 1998) 'collective learning' (Keeble & Wilkinson, 1999) 'institutional thickness' (Amin & Thrift, 1994) have

been generated in terms of how they shape the processes of regional economic development. This is a fundamental shift from the previous literature focusing on input-output relations, material linkages and transaction costs toward a broader concern with institutional conditions (MacKinnon *et al.*, 2002). The literature on industrial agglomerations and spatial proximity has also come to be treated in a new approach based on institutional atmosphere (Lee, 2001).

This new trend of regional development roots its theoretical base in evolutionary economic theory as opposed to neoclassical economic theory (Cooke, 1998; Cooke & Morgan, 1998; Morgan, 1997).

Unlike the neoclassical theory having somewhat unrealistic hypothesis, evolutionary theory puts propositions more near to reality such as heterogeneity of economic agents, uncertainty, bounded rationality and influences of institutions (Dosi & Nelson, 1994; Boschma & Lambooy, 1999). Neoclassical economics explains economic performance in terms of a production function consisting of two factors - labour and capital - and the development of the economy can only be decided by the increasing input of one or both of these factors. Thus, neoclassical economics does not put into consideration the effects of social and institutional factors (Wibe, 2003). The neoclassical theory considers that technology and learning are exogenously given, whereas the evolutionary theory regards them as the consequence of interaction with other firms and agencies (Cooke, 1998; Nelson & Winter, 1982). Evolutionary theory stresses path-dependent evolutionary change caused by specific institutional rules and practices over time, and the lock-in effect as institutional rigidity

(Boschma & Lambooy, 1999; Johnston *et al.*, 2000).

It seems that academics and policy makers in regional development adopt this theory as a focal perspective when they look into a region, because this theory could extend an understanding of innovation and technological change, and help theoretically and practically to create new pathways of economic development in a certain region. However, it is not easy to study and analyse dynamic and complex relationships among regional institutions, stakeholders and regional innovative milieus, thus each research related to regional developmental matters is studied from a specific angle as mentioned in the above section such as the learning process, institutional arrangements, and a systematic view of regional innovation.

All these approaches underline the role of institutional contexts and analysis in explaining socio-economic dynamics. A question is raised, what are institutions? The term 'institutions' has been loosely used in much of the literature. Institutions can be defined with relation to the terms, organisations, rules or laws, and conventions or repeated behaviours. The narrowest definition refers to institutions as non-market, non-profit organisations such as governments, public agencies, universities and so on (Dosi & Orsenigo, 1988).

But, Storper (1997) distinguishes between 'institutions' and 'organisations'. He defines 'institutions' as customary, and informal rules of practice between groups and individuals, whereas organisations are far more prescriptive political and administrative forms. The third, broader definition comprises all forms of organisations, conventions and repeated and established behaviours, and rules

and laws that regulate the interaction between individuals and groups (Edquist & Johnson, 1997; Dosi & Orsenigo, 1988). This broader definition also implies, as Dosi & Orsenigo (1988) state that;

*... the institutions which shape 'visions of the world', behavioural conventions, perceptions of opportunities, and interactions between the agents are an important ingredient in the expectation, what kind of technical progress they expect in the future, what appropriability mechanisms they try to build, how much they cooperate, and to what extent they compete with each other. (p. 19)*

This article principally adopts the broader definition of institutions, that is to say, institutions comprise organisations, and create the milieu within which innovation is undertaken and establishes the ground rules for interaction between the various economic actors.

Based on this theoretical background, two factors can explain how and why such institutional relationships are emphasized at the regional level; one is the highlight of interactive relations in modern innovation process, and the other is the importance of the localized learning process. This section discusses the evolutionary process inside the region, which can be a useful way to explain regional uneven development.

## 2) The Interactive nature of learning and innovation process

Modern innovation theory implies a sociological view of the process of innovation, in which interactive learning is looked on as fundamental aspect of innovation process (Lundvall, 1993). As

innovation is viewed as an interactive process, cooperative relationships and learning process between actors are stressed in innovation theories and practices (Morgan, 1997). Lundvall (1992) emphasizes that

*the most important process is learning... Learning is predominantly a interactive and, therefore, a socially embedded process which cannot be understood without taking into consideration its institutional and cultural context. (p. 1)*

The emphasis of interactive process arose from a critique of the linear model of innovation, in which innovation is considered to be the result of a linear process of different stages taking place in a sequential and one-way order (Massey *et al.*, 1992; Morgan, 1997). This linear way of explaining innovation leads to 'Technology (Science)-Push' and 'Demand-Pull' models. Technology-push model stresses that autonomous advances of science and the technological capacity are the main determinants of innovation; on the other hand demand-pull model considers the market forces as the origin of innovations. This linear model is useful to explain a relationship between long-term scientific research and industrial and economic growth, and the need for investment in risky R&D. This model also suggests how to make the relationships between science and production more efficient (Massey *et al.*, 1992).

However, the crucial problem of this model is the simple assumption that innovation takes place when basic research is connected to product and market. This model ignores the factor that more complex process for innovation can occur through the whole process. It considers R&D, in particular,

as the only source of innovation, and overlooks the feedback loops and interactions among the different stages of the innovation process. Moreover, this is originated from an elitist view of innovation and knowledge, which undervalues engineering and production skill in the innovative process (Morgan, 1997; Asheim & Isaksen, 1997).

Evolutionary theories of economies and technological change have now replaced the linear model considered as part of the Fordist era of industrial organisation and production (Asheim & Isaksen, 1997; Massey *et al.*, 1992). The interactive innovation model widely accepted in the modern view of innovation is regarded as an ongoing learning process engaged with various social actors such as firms and their customers, governments, universities, etc. The interactive learning of innovation is a complex social process, as Storper & Scott (1995) explained;

*the plurality of types of production systems and of innovation, 'small' process of economic coordination, informal practices as well as formal institutions, and incremental as well as linear step-by-step process running and adjustment.* (p. 519)

One of the outstanding contributions of the interactive model is to extend the theoretical and practical viewpoint concerning innovation and regional economic development, focusing on various relationships from the ones between firms and basic science infrastructure to interactive relations between producers and user at the inter-firm level, and between firms and the wider institutional milieu. Accordingly, the interactive relationships between regional stakeholders such as firms, governments and universities are

considered as critical to constructing regional innovative development. On the other hand, as interactions are becoming more relevant in the definition of a dynamic and open system, their measurement and the comprehension of their path-dependent dynamic behaviour requires a more detailed analysis.

A critical checking point concerning interactive process is the relationships between universities and the emphasis on interactive innovation. In the interactive process of innovation, universities' role in the regional innovative process can be regarded differently from that suggested by the linear model. As the interactive model stresses social process and recursive interactions; the roles of universities are expected not to limit R&D activities but to broadly support and interact with firms and other regional economic agents (Lundvall, 2002). Moreover, as knowledge is considered as a fundamental resource for innovation (Lundvall, 1992), the importance of universities has increased because universities can be seen as a reservoir of knowledge. Therefore, in academic literature, it seems that it is widely accepted that universities play an important role in regional innovative development; particularly, the interactive process between universities, firms and government are viewed as critical to constructing regional innovation. Here, a question arises with relation to universities and the regional interactive process; in what way and to what extent do universities engage with the regional interactive innovation process?

### 3) Localized process of learning

This part explores the other explanatory factor of

how and why localized institutional relationships are emphasized. In academic literature concerning regional economic development, the emphasis on the localized process for economic development seems to be widely accepted (Cooke, 1998; Keeble & Wilkinson, 1999; Capello, 1999; Lawson & Lorenz, 1999). Localized learning and interactive relationships are expected to actively create a number of economic and social relations to support regional innovative development (Capello, 1999; Lawson & Lorenz, 1999). Localized learning and interactions based on geographical proximity are becoming the decisive factors shaping innovation capacity, which is viewed as a way of explaining uneven regional development (Morgan, 1997). There are some academic expressions why these localized processes are emphasized in explaining recent regional economic development, as follows.

Firstly, as Lundvall highlights the fact that innovation is an attribute to the utilization of economically relevant knowledge, and regionally embedded knowledge is stressed in localized learning (Lam, 1998). In particular, tacit knowledge is highly personal, thus it is not easily codified and communicated. Tacit knowledge is collective in nature, and it is closely connected to interpersonal relationships, trust and cooperation (Lawson & Lorenz, 1999; Morgan, 1997). Furthermore, formal and codified knowledge is merely the tip of iceberg, because knowledge in nature is felt to be primarily tacit. As tacit knowledge and its diffusion are linked to geographical proximity and localized process, knowledge transfer enhancing innovative capacities strongly emphasizes the localized process of interaction.

Secondly, trust and institutional routines can be

viewed as a regionalized social capital, and they are expected to play an important role in interactive learning (Putnam, 1993; Morgan, 1997). As Lundvall argues that learning is an interactive and a social embedded process, he regards interactive learning as social network and relations. Social relations and networks are based on trust in interrelationships among individuals, because the possessors of tacit knowledge are not completely aware of what exactly they have and are unable to estimate its value. The value of tacit knowledge is difficult to tell before buyers have received it, while the seller has an understanding about it and cannot fully reveal it before clients buy. People cannot buy trust, but it can be learned in and through recursive interactions. Therefore, sharing trust, it needs recursive and routine processes in social networks and interactions. In the question of how to construct the routine process in social interaction, institutions can be an alternative to recursive interactions. Lundvall (1992) explains the need for institutional set-ups with the word 'uncertainty'. He argues that

*The institutional set-up ... is the second important dimension of the system of innovation. ... Institutions make it possible for economic systems to survive and act in and uncertain world.* (p. 10)

He also explains this characteristic of institutions;

*Institutions may be routines, guiding everyday actions in production, distribution and consumption, but they may also be guide-posts for change.... One of the fundamental characteristics of institutions is their relative stability over time.* (p. 10)

Institutions can play an important role in providing the stability to have trust and diminish uncertainty, and it also supports innovative efforts (Amin & Thrift, 1994). Putnam (1993) thinks of social networks, norms and trust that facilitate coordination and cooperation for mutual benefit as 'social capital'. Amin & Thrift (1994) regards the combination of factors including inter-institutional interaction and shared cultural norms and values as 'a local institutional thickness'. They also argue that "*a thickness establishes legitimacy and nourishes relations of trust*" (p. 15). In this line of thinking, 'trust' as well as 'institutional routines', 'social capital' and 'institutional thickness' is a critical factor in to promoting interactive processes, and they are highly localized characteristics focusing on face-to-face relationships.

The above discussions emphasize the localized learning process based on the nature of knowledge and geographical proximity, which eventually argues the relationships between the spatial process and innovative development in the knowledge based-economy. Accordingly, the degree of interactive learning and its infrastructure at a regional level are a way to explain uneven regional development.

### 3. The changing role of universities in society

During the last two decades, universities have been increasingly identified as the powerful drivers of innovation and economic change in the national, regional and international level. Much research has been done concerning universities'

role and behaviours engaging in their proximate environment. The research is broadly classified into two groups; one is to deal with 'the process of knowledge transfer' from universities towards firms, and the other is 'the engagement of the universities in their territorial development'. This classification is similar to Gunasekara's (2004b) distinction drawn between 'a generative role' and 'a developmental role' performed by a university. He argues that there are significant differences between the triple helix model highlighting universities' generative role and the university engagement literature in the conceptualisation of the role of universities in regional economic development. A generative role of universities underlines knowledge capitalization mechanisms, such as incubators, spin-offs and science parks. On the other hand, the university engagement literature points to a broader role to better support regional knowledge needs. Accordingly, it can be claimed that the generative role stresses the process of knowledge transfer focusing on the specific relations between universities and firms or within universities, and the developmental role underscores in terms of more general perspective, the engagement of the universities in their territorial development.

The literature addressing the specific process of knowledge transfer from universities focus on; the relationships between universities and industries (Jones-Evans *et al.*, 1999; Laursen *et al.*, 2003; Poyago-Theotoky *et al.*, 2002; Salazar *et al.*, 2002; Siegel *et al.*, 2003; Tomes, 2003; Gunasekara, 2006) and policies to support the cooperative relationships (Looy *et al.*, 2003; Caloghirou *et al.*, 2001; Azagra-Caro *et al.*, 2003); the discussion concerning universities' entrepreneurial roles such

as university patent, spin-off companies of new ventures and business incubators (Lazzeroni, 2003; Mian, 1996); the knowledge transfer offices within universities (Santoro & Gopalakrishnan, 2000; 2001; Jones-Evans *et al.*, 1999; Friedman & Silberman, 2003); and the triple-relationships between universities, industries and governments through a range of boundary spanning and knowledge capitalization mechanism (Leydesdorff, 2003; Etzkowitz & Leydesdorff, 1997). The literature generally researches, in the form of case by case, how universities effectively or ineffectively act to transfer and capitalize their knowledge. Even though some of the literature (Siegel *et al.*, 2003; Looy *et al.*, 2003; Gunasekara, 2006) critically point out that universities are not well enough equipped to support firms and regional learning processes, most of them start with the unseen assumption that universities are eager to transfer their knowledge, and actively take part in regional economic processes.

On the other hand, the literature focusing on the engagement of universities in their territorial development is found with two directions: theoretically and practically. One is, theoretically, to discuss a normative and conceptual role of universities in their territorial development (Chartterton & Goddard, 2000; Sutz, 1997; Lambooy, 2004; Mowery & Sampat, 2005; Lundvall, 2002; Paterson, 2001; Gunasekara, 2004a). The literature commonly puts in its emphasis on the role of universities as an entrepreneurial entity beyond teaching and researching, and assumes that universities play a crucial role in the regional innovation. Furthermore, it seems that the theoretical literature basically looks on universities as proactive actors seeking to engage regional

learning processes. Accordingly, the literature pays relatively little attention to the possibilities of inactive behaviours of universities in their territorial development.

The other is, practically, to examine the process of universities' engagement in the construction of regional advantage (Charles, 2003; Boucher *et al.*, 2003; Glasson, 2003; Dabinett, 1999; Kitagawa, 2003; 2004; Keane & Allison, 1999; Gunasekara, 2004b). Amongst the empirical literature, Charles (2003) studied, in the UK universities, new institutional arrangements and responses including internal changes within universities such as new regional offices, and more significantly, new collaborative regional arrangements and associations. Kitagawa (2003; 2004) identified, within England, the different strategic process of networking between universities with respect to current government policies which influence the resources and strategies of regional universities. Charles and Kitagawa contributed to the discussion surrounding the universities' different engagements in regional developments, but they neglect the complex interactive process between universities and regional stakeholders. A notable empirical contribution to the discussion of universities' regional engagement is presented by Boucher and his colleagues in the paper; '*Tier of Engagement by Universities in their Region's Development*' (Boucher *et al.*, 2003). They attempt to identify structural, institutional and social factors that interact to shape the participation of European universities in their regional development, by considering specific factors including regionalisation of the higher education system, regional identity and networks, and type of university. They suggest four categories of tier of



engagement by universities as a result of the effect of competition and hierarchy between them; single player universities in peripheral regions, multiplayer universities in peripheral regions, traditional universities in core regions, and newer technologically oriented universities in core regions. Their research contributes to understanding the universities' different engagements and how to categorize them, and suggest that policy makers should be more aware of the different range and levels of regional engagement by universities. However, their research focuses on macro-foundation regarding universities role such as the geographical, structural and institutional factors of universities, whereas they overlook interactive relations including interdependencies and conflicts between universities and other regional stakeholders such as government and industry.

The following two parts construct the basic grounding to understand the universities role in regional development in exploring the key questions; in general terms, why have universities changed their role in a knowledge-based society? What are the current roles of the universities in regional development? What are the variables in deciding their engagement in their regional innovative network? What are some implications for not only policy maker but also researcher from the current discussions?

Increasingly, the nature and role of universities are being re-examined both by national and regional policymakers and university management. Much of the literature about innovation concerning regional or territorial development and technological changes assumes that universities are important actors in constructing regional innovative

infrastructure and moreover promote regional innovative networks (Braczyk *et al.*, 1998; Etzkowitz & Leydesdorff, 1997; Gary, 1999b; Charles, 2003; Mowery & Sampat, 2005; Lundvall, 2002; Chatterton & Goddard, 2000).

At the policy dimension, the roles of universities in underpinning economic development are also stressed, as exemplarily seen in the following policy statements of the South Korean government.

*In the knowledge-based society, the universities located in the regions play an important role in producing high-quality labours and creating new technology-based firms. Therefore, it is necessary to strongly promote [the localization strategy through enhancing regional universities' capabilities], and to endow them the roles of central place and planning center for regional development. In addition, regional universities should be promoted as local R&D centres, which support regional firms and regional process of technology transfer.* (PCONBD, 2003: 12-3)

At this point, the following questions are raised: why are universities' roles in economic innovation more importantly stressed when compared to before? What is the universities' new mission to cope with current economic situations?

The university has changed and expanded its mission to meet the demand of current requirement. Etzkowitz (2004) explains that the focusing mission of the university has been shifted from 'teaching' and 'researching' to 'an entrepreneurial role'. During the 1970s and 1980s, the 'entrepreneurial role' that the university contributed to economic and social development

for its society, had been added to meet the need of economic and social development in the USA and some European Countries. Sutz (1997) states that in modern society it is impossible to explain the new role of the university with a 'two role model'; teaching and researching, and he suggests a 'three role model' which is focused on not only teaching and researching but also the university's direct relation to society. He emphasizes the new role of university particularly in the productive sector, so the third role is that the university has become a direct producer of goods and services for end-users such as firms, social communities and government. This third role of the university, so called 'the third mission' or 'the entrepreneurial university', can be defined that in addition to the university's traditional roles of teaching and research, the university is involved directly in the exploitation of research results, and more intensive collaboration with industry and regional economic development (Lazzeroni, 2003).

However, depending on the regional or national situation and the characteristics of each university, the emergence of the third mission may be different, as evolutionary economics basically assumes that universities are not homogeneous but heterogeneous. Therefore, the changing role of universities can be explained by various general and specific reasons throughout: from a sort of 'me-too' effect to a specific situation of the university. This part explains general background underpinning the changed role of universities in their society, which may help to understand the specific story of South Korean universities.

The question why the third mission of the university is emphasized in modern society can be answered in two different ways; one is the external

environment of the universities like their socio-economic situation, the other is from the internal needs of the universities.

Aside from changes in the external environment, why do universities accept the fact that they become entrepreneurial and commercialise their knowledge? And why do they take part in the process of exploiting 'knowledge capital' to enhance regional economic competitiveness? These questions come from the discordance between university's traditional mission and the new third mission. Traditionally the university has the long-term perspective and fundamental R&D for scientific research, but in the knowledge-based economy, industrial R&D stresses the short-term dynamics and objectives which are directly usable outputs and short-term oriented effort (Lazzeroni, 2003). Above all, shortage of the funds is perhaps the main explanatory factor (Sutz, 1997). Since both the increasing costs of scientific research and declining funds from central government make for universities financial difficulties, universities should turn their interest to industry as an alternative source of funding helping to replace some of the budget lost with public research funding cuts (Lazzeroni, 2003; Kitagawa, 2004). Nowadays universities are involved in the exploitation of their own research through patent licensing and the start-up of spin-off companies. These financial problems raised the competition between universities to gain more public and private funding, which make universities into survival game to find more funds. There is additional reason in South Korea; new student numbers have steeply decreased, since the offspring of baby boom generation in the 1950s after Korean War finished entering university. Therefore, universities

try to find out new ways to survive like public funding and entrepreneurial approach.

The universities' external environment that makes them change can be easily explained with the notion of 'learning region' closely related to the knowledge-based economy and regionalization. 'Learning region' is originated from the mixture Lundvall's idea of national innovation system and his emphasis on the learning (Lundvall, 1992), and geographical perspective of region (Florida, 1995; Morgan, 1997). Florida (1995) argues the importance of the knowledge and its flow and infrastructure in the learning region that

*These learning regions function as collectors and repositories of knowledge and ideas, and provide the underlying environment or infrastructure which facilitates the flow of knowledge, ideas and learning.* (p. 527)

Morgan (1997) stresses that regionally embedded institutional routines including interactive learning processes and networks promote regional innovative capacities, and reduce the uncertainty existing regional economy. He underlines the learning process between regional institutions by which uncertainty can be reduced.

With respect to the above term 'learning' and 'institutions', the role of universities is emphasized as important regional institutions having knowledge and its infrastructure, which can be a base of the learning (Agrawal, 2001). Therefore, learning region and universities cannot be separated. Universities in the leaning region play a crucial role as the knowledge producer and the important institutions for the regional learning process, as Keane & Allion (1999) say that;

*a key characteristic of the learning region is*

*the way in which knowledge is transferred from one group to another to create learning systems. Universities are a critical resource in this process.* (p. 901)

However, as Lambooy (2004) argues that the paths of learning are strongly related to the capacity of the agents to absorb new knowledge and the priority of their mission to engage regional networks, each university may differently engage in localized interactive processes. Moreover, even though universities are viewed as important parts of regional innovative development, the extent of their actual influence and engagement is not clear (Lambooy, 2004). This is because universities act as an agent which not only interacts with other actors for regional development and but also have their own aims as organisations.

In the light of this consideration, it might be interesting and useful to identify some explanatory factors when universities actually interact with other stakeholders in localized learning processes.

#### 4. The localized engagement of universities in regional development

This section tries to identify the conceptual or normative role of universities for regional development and the variables effecting on their local engagement. It may give the background knowledge prior to examining and understanding in the real engagement of universities' in their territorial development. Furthermore, some

questions will be generated in this section from the uncovered field by the current literature.

Much of literature has a slightly different viewpoint in classification of universities' role in their regional development. Lazzaroni & Piccaluga (2003) identify four specific missions of modern universities; a knowledge factory, a human capital factory, a technology transfer factory and a territorial development factory. Boucher and his colleagues (2003) classify the universities' role; economic entities, commodified knowledge producers (these two focus on direct economic contribution to their regional development), shapers of human capital and institutional actors in networks (these two include non-economic socio-cultural factors). Cooke (2004) categorizes five main contributions of universities; regional employers and customers as well as suppliers of goods and services, the supplier of intellectual capital to the labour market, research outputs such as publications, innovations and patents, international-standard technical and policy advisor, and regional economic support through entrepreneurship.

These three different classifications imply that the universities' role is not simple, and it is related to various aspects over social and economic parts. However, there are common points amongst the above classifications such as 'human capital' and 'knowledge producer', and 'economic role' concerning the third academic mission is underlined. Accordingly, the universities roles in regional innovative development can be broadly classified into three directions such as *human capital supplier, knowledge supporter and institutional actors in localized interaction*. This classification is from the consideration about

personal actor, knowledge and mechanism as the main elements for regional innovative development related university's capacities.

To begin with, it is widely accepted that universities play a crucial role in supplying human resources in their regional territories. Universities produce highly qualified graduates to regional industry, and firms' labours can have a chance to be retrained in the universities. Retaining regionally based human resources, so called 'embeddedness of human labour', can be viewed as a crucial factor to construct regional innovative environment with the increasing emphasis of 'tacit knowledge'. Secondly, as *the knowledge supplier*, universities is not only retaining the result of basic research but also involving the transferring process of applicable knowledge to their community and mainly industry. Thirdly, universities are also regarded as the institutional actor and *important node in the localized networks and interaction*, through various relationships with other actors such as governments and industries. With the growing support for the view that innovation is an interactive process (Morgan, 1997), localized network and interactions are increasingly emphasized. As knowledge stock, universities are viewed as one of the crucial stakeholders in the regional learning process.

However, in practice, these general contributions of universities to their regional development might be different depending on the characteristics of individual universities, the political-economical structure of both region and nation, and complex relations between and within universities and other regional stakeholders (Thinki, 1999; Gunasekara, 2004; Boucher *et al.*, 2003). These variables can be both the drivers and barriers when each university

responds to regional needs (Chatterton & Goddard, 2000).

Charles (2003) suggests two important factors influencing on universities' engagement in their regional development: one is the legal and institutional basis of the university themselves, such as the degree of independence of the institution from regional and national government, the nature of the funding relationships, and the powers, rights and assets of the university. The other is the will and organisational capability of the university, which shows to what extent the university has the intentions and objectives to interact with its communities.

Gunasekara (2004a) proposes six explanatory factors that shape the universities' role in the regional innovative development as follows: i) University's orientation to regional engagement: the nature of the senior management commitment to regional engagement and mechanisms; ii) History of university-region linkages: nature of historical linkages between a university and regional actors; iii) Complementary of field: degree of alignment between the research strengths of a university and regional knowledge needs; iv) Presence and influence of champions: university and regional advocates of university-industry linkages; v) Nature of regional industry base: type of industries in a region, and their demand for university knowledge transfer; vi) Political and economic conditions: influence of specific government policies and practices directed to the region and the university. Influence of specific economic conditions in the region.

It seems that Gunasekara develops and expands Charles' simplified factors with adding history of university-region linkages, complementarity of

field, presence and influence of champions, nature of regional industry base.

However, Boucher *et al.*(2003) comprehensively approach to identify structural, institutional and social factors that shape universities' participation in regional development. They use as main factors: the extent of regionalisation in the national higher education system; the type of region in terms of its core and peripheral features; the character of regional industry; the existence and type of regional network; and the number and scale of universities in the region; type of universities. They also use national factors to address the characteristics of the country, such as: the institutional arrangement governing universities; the mission and culture of universities; the funding of universities; the policies for research and innovation support. Furthermore, they suggest the factors that explain the nature of links between universities and their regions, such as: universities and the governance of regions; student migratory flows and local labour market dynamics; the role of universities in information society initiatives; management of universities; the social shaping of knowledge workers; universities and regional culture; the role of universities in regional innovation strategies; universities and sustainable regional development. Their main contributions are to identify the factors that decide universities' regional engagement, and to find out the tiers of engagement by universities depending on the influence of factors.

As a whole, on the base of the above three literature, the explanatory factors shaping universities' regional engagement can be classified into four categories, such as the characteristics of individual universities, national, regional and

Table 1. Explanatory factors shaping the engagement of universities in regional development

Classification	Explanatory Factors
The characteristics of individual universities	<ul style="list-style-type: none"> <li>- Type of universities (Comprehensive/Special, National /Private, Old/New)</li> <li>- The will and organisational capability of the university toward regional engagement</li> <li>- Spatial location of the university</li> <li>- Management of universities</li> <li>- Presence and influence of champions</li> <li>- The culture of each university</li> <li>- The difference in international, nation, regional and local orientations by type of university</li> </ul>
The National context	<ul style="list-style-type: none"> <li>- Institutional autonomy/independence of the university from national government/ institutional arrangement governing universities</li> <li>- The extent of regionalization in the national higher education system</li> <li>- The powers, rights and assets of the university by national government</li> <li>- The nature of national funding relationships</li> <li>- Other political and economic conditions</li> <li>- The national culture of universities</li> </ul>
The Regional context	<ul style="list-style-type: none"> <li>- University and governance of regions/independence from regional government</li> <li>- History and characteristics of university-region linkages</li> <li>- The degree of alignment between the research strengths of a university and regional knowledge needs</li> <li>- Presence and influence of champions</li> <li>- Influence of specific economic conditions in the region.</li> <li>- The existence and type of regional network</li> <li>- The number and scale of universities in the region</li> <li>- The nature and character of regional industry base</li> <li>- The engagement of the regional government</li> <li>- Regional milieu and culture/regional identity</li> <li>- The significant of competition between universities</li> <li>- The type of region in terms of its core or peripheral features</li> <li>- The social shaping of knowledge workers</li> <li>- Student migratory flows and local labour market dynamics</li> </ul>
Policy context	<ul style="list-style-type: none"> <li>- Influence of specific government policies and practices directed to the region and the university</li> <li>- The Policy for research and innovation support</li> <li>- The direction of the policy; top-down/bottom-up</li> <li>- The characteristics of the policy</li> </ul>

Sources: Adapted from Charles, 2003; Gunasekara, 2004a; Boucher *et al.*, 2003.

policy contexts, which are seen in Table 1.

In line with the changes of the socio-economic environment such as globalisation and the knowledge-based economy, the relationship between the role of universities and the

localization of economic development are themes currently being explored with academic literature. The connection between them is clear. The terms, 'tacit knowledge', 'social capital', 'intangible asset' and 'untraded interdependency' are viewed as key

factors in the localized learning processes, and their acquisition and the processes by which they are transferred are more effective when localized. Therefore, the economic performance of regions can be improved when universities are encouraged to become better innovators by interacting with other regional stakeholders.

However, this idea is highly tempered by the specific contexts of geographical areas such as higher educational governance and economic situations as well as strategies adopted by individual institutions. Therefore, in reality, the issues discussed here should be considered in relation to socio-geographical characteristics of the individual region. For example, in South Korea, it is anticipated that higher educational systems may be differently developed from that of Western countries, and its universities may have undergone some problematic issues in their territorial development.

## 5. Conclusion

Universities are considered as important institutions to sustain regional development, because they have a stock of knowledge and high quality labour as well (Cooke, 2004). However, there is not a single angle which looks into a university, comparable to the way a firm is viewed as a profit-seeking economic agent. Moreover, in recent decades, the emphasis on the third role of a university makes it more complex and difficult to study the university from a certain fixed perspective. Therefore, most research concerning the roles or behaviours of universities is

approached from a comprehensive viewpoint rather than a single or fixed perspective (Chatterton & Goddard, 2000; Kitagawa 2004; Charles, 2003). Alternatively, a specific field of a university's activities such as the business incubator of a university, the role of the knowledge transfer office is studied (Mian, 1996; Jones-Evans *et al.*, 1999).

The reason for the above characteristics of the university related study, it seems, is partly that the functions, objectives and behaviours of the university are not simple, which makes researchers approach from different perspectives. It is also partly because the behaviours of a university are influenced by the degree of their independence from regional and national governments, which leads the researcher to examine a university and its socio-economic environment together. These rationales give a warning that adopting a specific perspective when looking into the university such as regarding it as simply a service institution or an economic agency may lose sight of its other features.

The above discussion leads us to the conclusion of some issues. The first issue is that the university is not a static, but a dynamic institution. Most literature dealing with the university's role and behavior empirically or theoretically examines the activities of the university with relation to its surrounding communities. The university interacts with other institutions and its outside societies to gain external resources such as updated knowledge, funding, new students, etc., and these activities make it possible to exist and to upgrade its competence.

The second issue is that universities are not a homogenous unit (Cooke, 1998). From an

evolutionary and institutional perspective, universities are differentiated through making use of variable proportions of non-homogenous inputs depending on their situations and competence, and they are conceived of as organisations with a certain degree of resource-development capacity of their own (Boschma & Lambooy, 1999; Fagerberg, 2002; Witt, 2002). However, there may be some routine processes or common characteristics among the universities placed within a certain geographical boundary and engaged in the localised interactive process.

Thirdly, it is assumed that the role and interactions of the university are influenced by the legal and institutional basis of the university itself. The ability of the university to participate the localised interactive relations, somewhat depends on the degree of its independence from regional and national governments (Charles, 2003). The university operates within nationally regulated and funded regimes, which may vary from country to country.

Fourthly, the university's engagement in regional economic development is also influenced by the specific regional contexts, such as the regional industrial base, the number and size of regional universities and regional specific milieu and regional governance of higher education, etc. The university's interactions with regional stakeholders may be highly determined by regional demand for the university's engagement, and the regional demand may be decided through the complex process of various regional contexts.

Lastly, these issues have critical implications for the research methodology. They demand that the methodological and analytic framework should capture universities' dynamic interactions with

other institutions. They also ask that the methodology should be sensitive in order to describe and explain the dynamic interactions in response to government initiatives following the legal and institutional background.

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## 지식기반사회에서 대학과 지역발전의 관계: 진화론적 관점

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**요약:** 지식경제의 중요성이 부각되면서 지역발전에서 대학의 역할이 재평가되고 있다. 본 논문은 선행연구에 대한 문헌고찰을 토대로 지식기반사회의 도래에 따라 지역발전에서 대학에 요구되는 새로운 역할을 재정립하고 관련 변수들을 검토하였다. 기존의 연구들은 주로 대학의 역할과 기능을 단선적으로 간주하는 경향이 있다. 하지만 대학의 기능과 목적 그리고 행태 특성은 제각각 상이할 수 있다는 점을 인식할 필요가 있다. 그 이유는 대학 자체의 규모와 조직 특성 등 조직적 요인뿐만 아니라 중앙 및 지방정부의 정책과 지역산업의 특수성 등 외부환경적 요인에 의해 대학 조직의 진화 경로가 상이한 패턴을 나타내기 때문이다. 이처럼 지역발전에서 대학의 역할은 단순히 지식생산 및 서비스기관 등으로 인식하는 정태적이고 단선적인 관점에서 벗어나, 대학을 역동적이고 이질적인 조직적 실체로 바라보아야 한다. 아울러 지역발전의 맥락에서 대학의 역할은 조직의 특수성과 더불어 환경특수적인 맥락에서 접근되어야 할 필요가 있음을 강조한다. 이러한 인식을 토대로, 본 연구에서는 지역발전에서 대학의 역할을 개별 대학의 조직 특성, 국가적 맥락, 지역적 맥락 및 정책적 맥락에서 구분하여 제시한다.

**주요어:** 지역발전에서 대학의 역할, 지역혁신, 국지적 학습 과정, 진화론적 관점

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