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Knowledge-based Development and Its Relation to Economic Prosperity in Developing Countries

Shah Md. Atiqul Haq[1]

[1] Asian and International Studies, City University of Hong Kong, Hong Kong

Correspondence: Shah Md. Atiqul Haq, Asian and International Studies, City University of Hong Kong, Hong Kong. E-mail: shahatiq1@yahoo.com

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Abstract

This paper explains how integrative knowledge-based development can contribute to economic growth and social development as an important field of research. We show how it would be useful for country-specific demands and issues, and the significance of investment in knowledge-based research and the importance of universities in the practice and advancement of integrative approaches of knowledge-based development. Academic communities still prefer knowledge and research from applied sciences and physical sciences to contribute to government policies and initiatives in the context of development. But there is less attention paid to the contribution of the social sciences to economic and social development. Recently, research has been emphasized that incorporates multidisciplinary approaches in problem solving and best solutions for improving social, environmental, political, and economic crises. Though knowledge-based development is an international phenomenon, the concept of knowledge-based development as a form of capital and a well managed investment is still not realized in developing countries compared with developed countries. Universities are a platform to promote and advance knowledge-based development by cultivating multidisciplinary and integrative research beyond individual discipline boundaries.

Keywords: knowledge-based development, knowledge transfer, integrative approach, developing countries, universities

1. Introduction

We live in an age where learning, innovation and knowledge have become key drivers of economic development. Institutions associated with promoting attributes such as learning, innovation and knowledge are regarded as vital to ensure sustainable economic success in a society (Robertson, 1999; Cooke, 2002; MacKinnon et al. 2002). Though the contribution of knowledge towards socio-economic development of a society has a long history (Castells, 1996), only since 1996 has knowledge-based development been widely used and encapsulated as an idea that has economic and social contributions for our collective future (Thompson, 2007). Knowledge-based development as an international phenomenon has been involved in development policies and its efficient implementation has been emphasized (Etzkowitz & Leydesdorff, 2001).

Nowadays, nation states, multinational organizations, universities, and business enterprises are emphasizing and promoting the notion that the principal means of economic progress and social development are through the adequate capturing of knowledge as a form of capital and investment. Even though there is much diversification in the number and type of knowledge producing organizations, universities as a centre of excellence can promote economic prosperity (Gibbons et al., 1994). Nevertheless, any knowledge produced requires patents by which knowledge-based development is measured and monitored as a form of capital (Powell & Snellman, 2004). In this context, knowledge produced in the social sciences has few patents and, as a form of capital, the contribution of social science knowledge to economic prosperity and social development has only a few concentrations. However, in the era of globalization, knowledge is extensively considered as a form of capital (Kahin & Foray, 2006).

Therefore, within the domain of the social sciences, the importance and benefit of knowledge transfer from universities to business and the systematic use of resources for the benefit of stakeholders should not only be emphasized and analyzed in developed countries but also should get more focus in developing countries as well (Stevens & Bagby, 2001). Stevens & Bagby (2001) consider the relationship between government, universities

and business as a primary key for knowledge production and knowledge transfer. But it is unsure how successful the connections between government, universities and business are and whether such connections or knowledge transfers are systematic or not. Nor is it clear how the outcome of research on knowledge-based development can contribute to economic prosperity and social development in developing countries. These kinds of questions still need to be explored in the context of developing countries so that they could be able to compete in knowledge-based development and employ knowledge as a form of capital and investment for socio-economic development in the era of globalization. Though there are different definitions of a developing country, usually a developing country means a country with a low level of income and a low level of material well-being, but the level of development may be different and even vary within the concept of developing countries (United Nations, 2008). According to the United Nations, Japan in Asia, Canada and the United States in North America, Australia and New Zealand in Oceania, and Western Europe are considered developed countries. And in the 21st century, Hong Kong, Singapore, South Korea and Taiwan in Asia, and Cyprus, Malta, and Slovenia in Europe are considered as "developed countries" as well (IMF, 2009). The World Bank classifies countries into four income groups according to GNI per capita. The classifications include categories such as, Low income countries with GNI per capita of US$995 or less; Lower middle income countries with GNI per capita between US$996 and US$3,945; Upper middle income countries with GNI per capita between US$3,946 and US$12,195 and High income countries with GNI above US$11,906. The World Bank classifies all low and middle income countries as developing but all the countries within the group might not have the similar level of development. This paper tries to provide implications and suggestions to developing countries, especially the low income countries classified by the World Bank, based on a few case studies of developed and developing countries as well.

Generally, this paper considers knowledge-based development models, especially the “triple helix model” which emphasizes the relation between government, universities and business for understanding how knowledge practices in universities can contribute to economic prosperity and social development with special reference to developing countries, since most developing countries are still not able to adopt fully the notion of “knowledge-based development” and its connection with the transfer of knowledge from university to business as a form of capital and investment within the domain of the social sciences.

2. Knowledge-based Development Models

Although there are many models on knowledge-based development, it is difficult to find a model that is more convergent on the issue. For instance, Cantù et al. (2009) proposed six components of knowledge-based development models: 1. an institutional mission that is the central and guiding element; 2. social, human and intellectual capital; 3. research products; 4. research funding; 5. entrepreneurial initiatives; and 6. the education model. In the discussion, they emphasized also some other elements, such as, 1. teaching and research universities generate scientific and technological knowledge; 2. social, human and intellectual capital (professors and students) are the real generators of knowledge and need an environment in which talent is nurtured; 3. models of organization for knowledge environments are needed for cooperative work. 4. ICT-based tools that support the knowledge management processes are a sine qua non for successful implementation; and 5. leadership and high-level management support is a fundamental element for the model’s success.

Based on the above components, it could be said that there needs to be a good combination among institutional arrangements and supports by providing appropriate value for the nurturing of social, human and intellectual capital for economic prosperity. And there should be a good cooperation between universities, leadership, and management to provide an environment for a successful mission for economic and social development of a society. The combination of these components should be monitored, managed, and nurtured by the cooperation and partnership between government, university and business for entrepreneurial support and initiatives by providing adequate research funding to universities. Universities should also strongly embrace new challenges to prepare qualified professionals and generate scientific, technological and innovative knowledge for creating new knowledge-based companies and upgrading existing companies for economic prosperity (Matthiessen et al. 2006). Cantù et al., (2009) adequately say that “knowledge and intellectual capital are now the bases of a new source of wealth for organizations and are engines of economic and social development”.

Kleine and Rosenberg (1986) mentioned that commercial innovation depends on two forces that influence successful outcomes in innovation. One is the market force and the other is the force of progress at the technological and scientific edge. They argue that innovation involves change and uncertainty. And if innovation targets reducing uncertainty and an exercise in management, then there are uncertainties about technical performance and market response to absorb and utilize changes effectively. They mentioned that there is a correlation between the degree of uncertainty and the amount of change and they suggested considering multi-dimensions of innovation, since successful innovation varies case to case, in which there will be a design

for balancing the requirements of new products and manufacturing, and maintaining activities that need to be supported by an organization. They understood innovation as a new process of production, a substation of a cheaper material, organization of production, internal functions or distribution arrangements and improvement in instruments or methods of doing innovation (Kleine and Rosenberg, 1986). They explained innovation as a linear model that includes research to development, development to production and production to marketing.

Science and innovation are interrelated and complementary, and Kleine and Rosenberg (1986) consider "science as the creation, discovery, verification, collation, reorganization, and dissemination of knowledge about physical, biological, and social nature". They mentioned that currently stored total human knowledge about nature and the processes that bring corrections of that knowledge have an effect on innovation. They described a chain-linked model and they consider a feedback mechanism between different components of the model, such as research, knowledge, market, investment, design and distribution. Innovation should not only be linked with science but also should include the development process as well. So the need of science depends at various different stages on the central-chain-of-innovation and it should focus on a holistic approach as a system, exploring how different components of a system interact with each other with the outcome depending on effective interaction between the components. Based on the central-chain-of-innovation model, they suggested five major pathways that could accelerate the innovation process and research, such as feedback, side-links, long-range generic research, potentiating of new devices and processes and essential support of science. In conclusion, innovation as a process of change in a system not only considers changes of hardware but also should consider the market situation, investment, production services and facilities and importantly the socioeconomic contexts of an innovating country or organization or institutions (Kleine and Rosenberg, 1986). According to Walby et al. (2007), a knowledge-based economy includes the specific industrial sectors of the economy that are most reliant on knowledge, such as information and communication technologies, biotechnology and knowledge intensive services. In the model, they focused on the industries that are involved extensively with knowledge for promoting knowledge-based development. Porter (2003) considers knowledge-based development with economic competitiveness and he emphasizes the more frequent interaction and extensive networking between knowledge producers, private sectors and the public as a channel of faster technological and commercial development. He emphasizes the more frequent interaction and extensive networking between knowledge producers and the private sector to perform as a channel for innovation and to ease the fast technological and commercial development of knowledge based sectors (Thompson, 2007), in which there will be competition besides cooperation. According to Porter (2003), clusters are geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated organisations (such as universities, standard agencies, trade associations) in a particular field linked by commonalities and complementarities. The existence of clusters suggests that a good deal of competitive advantage lies outside companies and even outside their industries, residing instead in the locations at which their business units are based (Porter, 2003).

That is the way cluster increases productivity, capacity for innovation and stimulates new business formation. Considering Porter's explanation, there has been a lack of relationship between companies, universities, and trade organizations in developing countries, where adequate policies and their implementation to bring extensive outcomes from the investment in research in universities has not yet developed due to the absence of infrastructure support, finance, planning and motivation. In that case, government should take steps to increase competition between universities to do the most important research and contribute research output to capitalize the country's economic growth and social development in developing countries in a more professional and sophisticated way.

The most important discussion on knowledge–based development was by Etzkowitz and Leydesdorf (2001). They developed a model called the "triple helix model". The term "triple" refers to three important sectors: universities, business and government, and the term "helix" refers to the complex and intertwined nature of relationships between the sectors. According to Etzkowitz (2003), the triple helix model denotes the university-industry-government relationship as interdependent and the nature of the relationship will be equal between these three organizations. Even though there are many diversifications in the number and type of knowledge producing organizations, universities as one of the centers of excellence can promote a knowledge-based economy and a knowledge society (Gibbons et al. 1994). Therefore partnership and interconnection between the producers and exploiters of knowledge is very important for economic development, in which government roles are important for promoting partnership and connection between university and industry (Thompson, 2007).

Developing countries have not yet developed good governance and stability in political aspects. Still these

countries are in the process of establishing such a system. It is also true that there has been no good partnership and connection between government, universities and business where mostly business and investment in research in universities follow political affiliation, and even business is controlled based on political decisions, neglecting the importance and qualitative judgments about investment in research and connecting research output with business enterprise in many developing countries. The model emphasizes universities and government to initiate extensive reform activities to maximize the capitalization of knowledge produced in universities. This kind of reform initiative in developing countries is important for knowledge-based economic development and it will be effective if government establishes partnerships between universities and business and good governance at the regional level for a more flexible overlapping system with each taking the role of the other for the country's betterment. According to the "Associational model" by Cooke & Morgan (1998), the most important role in the process of innovation and economic growth should be played at the regional level. Here, the proximity between firms and institutions of the innovation, such as universities and regional development agencies will promote learning and mobilization of knowledge assets (Cooke & Morgan, 1998). In the 21st century, there is a growing use of knowledge resources and technological advancement in which learning and the ability to learn is strongly associated with economic prosperity and success, though it depends on the social and political system of the specific region in which the relation between industry, universities and government are being operated that will accelerate or delay progress (Cooke & Morgan, 1998). Cooke & Morgan (1998) emphasize the importance of continuous communication and feedback between firms and the institutions of the innovation system.

This model is based on an interactive approach and is very important in developing countries. The continuous connections and updates discussed between universities, government and industries will direct the appropriate development of public policy to ensure stakeholders participate for the effective maximization of knowledge-based development for economic prosperity in developing countries. The concept of knowledge based development still has not been successfully included in the discussion and research as in developed countries. There is a need to disseminate the ideas and success stories of knowledge-based development in developed countries to the developing country's governments to take initiatives to increase investment and interest in research in universities, industries and research institutes and their respective departments as well. In conclusion, from the above discussion, the three models discussed and emphasized on the connectivity and partnership between different sectors are basically government, university and industry. Also the models concentrate on the public policy of knowledge-based development in which stakeholder participation needs to be confirmed to have better feedback for economic and social development. The discussion and principles of the three models are important to follow in developing countries, but developing countries also should consider their regional aspects of knowledge-based development and demands.

Moreover, massive government subsidies for business related research, escalating societal and global needs, and corporate alliances with universities are fundamentally altering the transfer of knowledge to economic markets (Feller, 1999), which is becoming a strong success story for developed countries but it has not yet shown remarkable success in developing countries. It is also recognizable that government, universities and business are providing attention to the shorter payback horizons for investments, in which they are allocating fewer resources for basic research (Stevens & Bagby, 2001). It is important to have a systematic or instructive paradigm that will guide the transfer of knowledge from university to business following basic principles and ethics within competitive global political and economic demands (Stevens & Bagby, 2001). This would be possible through integrating multidisciplinary approaches and giving more attention to stakeholder participation, which will produce integrative and inclusive knowledge-based development in developing countries. To do that in developing countries, there should be an adequate inter-organizational connection and structure between universities, government, business and policy adoption.

3. Developing Countries and Knowledge-based Development

Kayal (2008) mentions the concept of a 'national innovation system' as a long term process for a nation's economic development. He also argues that the concept is more complicated and requires a more systematic understanding of the relationship between science, technology, socio-economic development and innovation. He considers that every system has different components and each component brings attributes. He shows that innovative system components are interdependent and linked with each other. Innovative systems have functions that contain economic value, though their diffusion, utilization and generation varied from country to country and sector to sector depending on the level of technological development. For instance, if we consider a country as a whole system, many sectors and actors perform for sustaining the system and contribute to socio-economic development of the country. In the process, the interconnectivity and a balanced relationship between private

sectors and government sectors are very important, such as the relationship between industry, university, government and services (Smith, 1997).

Kayal (2008) develops a model and provides some interlinked components of a national innovative system and shows how the connection and implementation of this model could be used for socio-economic development in developing countries. He identifies six sub-systems, such as science and technology policy, innovation strategy, technical human support services, technical support services, mobilizing financial resources and international cooperation. And he mentions that the interplay among all the sub-systems performing together and integrating with each other give a transformation having more economic value and development in developing countries as well. Nelson (1993) identifies some points in innovative systems that result in a higher level of economic value, such as competitiveness, interactive linkages, promoting exports, and expanding funds for research linked with business in university and research centers. But the appropriate practices of the components vary from country to country, and the concept of an 'innovative system' has been developed based on the context of more developed economies (Kayal, 2008).

Kayal (2008) argues that developing countries are less developed in terms of institutional composition, sophistication of scientific and technological activities, and links between organizational units compared with developed countries. He mentions different examples about the relation between government, industry and research. Government innovation policies played key roles for advancing competiveness in Taiwan (Shyu and Chiu, 2002) through diffusion of technologies, enhancing public research and establishing product technology consortia (Wong, 1999). Government investment in education and research and government policies strengthen the linkage between research, industry and government in South Korea (Kim and Dahlman, 1992). The Singapore government encourages and facilitates investment and technological learning from Multi-National Corporations (MNCs). The learning from MNCs diffuse to medium size enterprises, even at a local level, and this was faster than in Taiwan and Korea (Wong, 1997).Wong (1997) mentions that the Singapore government significantly accelerated and encouraged the development of research and funding of development research with a supportive infrastructure.

Knowledge-based development and a knowledge economy have been the most popular concepts in developed and developing nations. Developing countries need to follow and join with ideas coming from the knowledge driven economies in developed countries (Mian et al., 2010). The World Bank (2007) provides a few key elements of a knowledge economy, such as economic incentives, supportive institutional regimes, educated and skilled workers, private and public firms working together in an effective innovation system, and modern and adequate information infrastructure that should be followed at a national level at different stages of development. Mian et al., (2010) argue that the connection among the elements and investment in the development of the infrastructure are important for a sustained use of knowledge and adaptation of a knowledge economy. Corona et al. (2006) suggested the key actors, such as technology-based firms, government programs and incentives, and universities and research and development centers should play pivotal roles for the development of a knowledge economy. And they refer to some regional contexts such as entrepreneurial culture, knowledge workforce, quality of life, lower cost of doing business, traditional industrial base and regional infrastructure, and that the consideration of the contexts of the local and regional level are important for the development of knowledge-based development. There should be a balanced interconnection between key actors and key regional contexts in which both are complementary for the socio-economic progress of a country.

4. Knowledge-based Development and Policy Suggestions from Case Studies

A study conducted by Heitor and Bravo (2010) on Portugal knowledge-based development considered factors such as people (human resources), knowledge (creation of new knowledge) and ideas (knowledge diffusion). They also take into consideration incentives (public and private efforts) and institutions (sufficient conditions) in their analysis of Portugal as well. The study suggests that the innovative capacity of a nation largely depends on favorable social settings and dedication to change policies and to necessary reformations. And there should be multi-stakeholder participation from public and private sectors in which knowledge integrated communities and users of knowledge should play a significant role for accelerating the national innovative system of a country and economic prosperity of the country. They recommend an increase of the number of researchers, competence building, widening of social basis for fostering knowledge, and skills through a connection between formal and informal education for human resource development in Portugal. They encourage the building of local capabilities and providing a social shape of technology, but that there should be infrastructural development and incentives for a particular context and settings for economic prosperity of a country. In this case, people of a country should have the accessibility, affordability, usability and adaptability for new technologies and knowledge-based development.

Heitor and Bravo (2010) argue that government should play an influential role for networking and establishing collaborations between university research, industry and the public so that people in particular settings get infrastructural facilities, incentives and institutional framework and management for socio-economic development through knowledge transfer and internal absorption of technology from external sources. They suggest strengthening external social links and system links of a country so that there would a brain circulation within an international arena and global competition for transferring knowledge and sharing among different national and international stakeholders. They conclude that long-term policies, dynamism, integration, technology commercialization, incentives, infrastructural facilities, monitoring and management, and continuous adaptation would concentrate knowledge integrated communities and users of technologies through linking public and private agents nationally and internationally for economic prosperity, in which the role of universities in higher education and research would be highly emphasized. Research universities worldwide foster a range of technology transfer and commercialization with industrial liaisons for entrepreneurship and launch technology-based production and services (Heitor and Bravo, 2010).

Developing countries should have public policies for promoting science and technology for increasing capabilities and creating market needs for technology, and there needs to be technology transfer by linking market demands and technological capabilities (Kim and Dahlman, 1992). The National Innovative System (NIS) of a country links public and private sectors and funds for research and education. There is a need in a country to have absorptive capacity so that industries and firms can absorb externally produced technologies and use them internally. To do this, firms and industries should have research capacities linked with a university or research institute (Mowery and Oxley 1995). Kayal (2008) argues that for economic strength, developing countries need to understand their competitiveness, advantages, weaknesses and strengths. And he encourages the indigenous capacity of a country to absorb and adapt new technology from other countries. NIS should provide the opportunities and support locally developed technology so that they can be able to compete in international markets. He provides a NIS (National Innovative System) framework for developing countries from Newly Industrialized Economies, namely South Korea, Taiwan and Singapore. In this framework, he mentions three drivers (supply of technology, linking mechanism and demand for technology) and three major components (planning, infrastructure and resources) for technological innovation and socio-economic development. He uses the framework to assess the status of the National Innovation System (NIS) in Saudi Arabia. He suggests that Saudi Arabia needs to encourage technology based education and establish research institutes in universities. He finds a small investment in research and development, and a lack of connection between university and government policies. The country passed a long term science and technology policy in 2002 that shows the level of linkages, management and planning between government, university and also the public. For developing countries, it is important to have the capacities for absorbing technologies from external sources and internal transfer. He suggests that there should be integration between drivers (supply of technology, linking mechanism and demand for technology) and components (planning, infrastructure and resources) (Kayal, 2008).

Mian et al., (2010) compared knowledge-based development between Pakistan and Mexico as emerging nations. They found in their case studies that Mexico and Pakistan have limited success in creating innovative environments in the different knowledge regions in those countries. They claimed that scarce resources for investment in research, development, and innovation, and weak relations between different actors, such as university-government-industry and a lack of coordination and cohesiveness are the challenges for promoting an innovative environment and a knowledge economy in Mexico and Pakistan. From the Mexican experience, they suggest that there should be long-term strategies, support for adaptation and creation of new technologies, development of institutional frameworks and incentive policies for an innovative economic system in developing countries like Pakistan.

From the Pakistan experience, they mentioned that there is a lack of trained and skilled personnel, an absence of connection between government-industry-university and poor receptive capacity among common people as being the major challenges for creating an innovative environment, although the country has been experiencing a relatively higher economic growth. They conclude that links between government-industry-university, government policies, investment and funding in research and development, human capital development, infrastructure development and popularizing a national innovative system, indigenous endeavors, niches between regional and international markets through development of competitiveness and adaptability for new technologies and creating new ideas in a sustained way are very influential for the development of a knowledge economy and social development, also in developing countries like Pakistan.

Pavitt (1991) argues for the economic usefulness of basic research and basic science for public policy. For economic welfare and efficiency, different countries made policies for basic science while the demand for

research skills and knowledge was highly emphasized (Fagerberg, 1987). Pavitt (1991) considered growth of sciences as a factor of production and discussed public subsidy for basic research, contribution of science to technology and internationalization of science and technology. From the economic point of view, he discussed the funding for research and development, and evaluation of the performance of basic research performing institutions. Tocqueville mentions the expansion of science as a fundamental source of knowledge to solve and guide practical problems. Modern science increases the professionalization and specialization in modern societies and a large investment in the sciences might not only be understood based on a culture and aesthetics view but also has important social and economic dimensions (Pavitt, 1991). Pavitt (1991) emphasized the economic and social benefits of the development of research and its applications, internationalization of scientific and technological activities, and efficiency and structure of scientific research of a country. He suggested that whatever the policy on basic scientific research, there should be an application for scientific activities by business firms. He strongly suggests the application of basic research and comparing appropriateness of results between firms with infrastructural facilities, internationalization, and subsidy for basic research and training (e.g. Science Park). He also emphasized the economic and social dimensions of basic research for the well-being of a society and that economists and social scientists get benefit in analysis and accuracy through producing and transmitting information as a training and collective body of knowledge for economic prosperity.

Using Thailand as a case study of a developing country, Intarakumnerd et al., (2002) found the difference between development countries and developing countries for the development of technological capture and they suggested to study the national innovative system (NIS) in developing countries from a different perspective. They found that NIS is not linked with the economic structure of Thailand, since the country has had a structural change from agriculture to an industry and service oriented economy. They mention that there is a mismatch between techno-economic changes and the socio-institutional framework and they argue that the country is in a transformation and structural crisis. The country wanted to follow a techno-economic system with a development of NIS following developed countries, but it has faced a serious lag between structural changes and adapting the techno-economic system due to severe international competition and external forces. They suggest that developing countries like Thailand should follow the activities of innovation for improvement, but there should be a consideration of the factors influencing the weak and fragmented development of a National Innovative System (NIS) and figure out the obstacles to balancing changes between structural changes and the techno-economic system. They mention for the Thailand case that there is a lack of networking and links between political interference, government and other originations and institutions for initiating policy and coordination of the improvement of the National Innovative System (NIS) through a favorable cooperation among the involved actors, reforming bureaucracies, dedication, and prioritizing meritocracy (e.g. Japan and East Asian countries), links between government, bureaucracy and private sectors and that would be gradually followed in developing countries like Thailand (Intarakumnerd et al., 2002).

5. Universities and Knowledge-based Development

Any kind of knowledge produced through the support of government and business contributes to economic development and the most effective institutions, especially universities, are needed to be best positioned to produce that kind of knowledge production (Gibbons et al. 1994; Etzkowitz & Leyesdorff, 2001). Government should provide all kinds of research facilities and favorable environment to produce knowledge for the economic prosperity in developing countries. It is also true that there are many public and private research institutes that contribute to economic growth. Therefore universities are playing a dominant role in knowledge production. But we need to mention that many universities capitalize the idea that knowledge is a form of capital to position themselves as key actors in the national and regional economies in which they are situated (Thompson, 2007). There are some observations by Delanty (2001a) on the university contribution to knowledge-based development-1) the entrenched liberal critique (university seen as in crisis due to the decline in its autonomy) ; 2) the post modern thesis (knowledge and hence universities losing their emancipatory role because of the increasing fragmentation of knowledge) ; 3) the reflexivity thesis (a new mode of knowledge is developed based on new relationships between the users and producers of knowledge) ; 4) the globalization thesis (universities becoming part of global markets and information based capitalism).

In an age of globalization, universities are evolving from traditional modes of knowledge production to more socially accountable research paradigms (Gibbons et al., 1994). And in the new paradigmatic shift, multiple actors from different schools of thinking and practices come together to produce knowledge and tackle problems that hamper the economic and social development of a country (Thompson, 2007). Gibbons et al. (1994) define the shift as “mode 2”, which is characterized by a shift away from the search for fundamental principles towards

modes of enquiry oriented towards contextualized results. But it is argued that most universities are far away from the transformation of traditional modes of knowledge to mode 2 due to the absence of infrastructure, the skills and the partnership with businesses (Boucher et al. 2003; Harloe & Perry, 2004). In the context of developing countries, it is difficult to say that all universities shift to mode 2 where infrastructural development and investment in research are not well established. And there are also some traditional ideas that any knowledge production will be within its disciplinary boundary. It is also important to mention to what extent the ideas of paradigm shift are being communicated to all universities in the era of globalization where many developing countries are starving for food, and preparing to tackle natural catastrophes due to climatic change.

Delanty (2001b) adequately says that interaction and communication or engagement is not only important for survival and the growth of higher education or economic development but also knowledge is socially constructed. Knowledge generation will be for a wider society and as a part of social life (Delanty 2001b). Walshok (1995) identifies two important points how universities can maximize their contribution to socio-economic development. Firstly, communication with a range of the public on universities' past contribution to economic and social development must be improved in order to explain their utility to the taxpayers who fund them. And secondly they need to develop better institutional mechanisms for communicating new knowledge and for getting the public involved in the generation of knowledge (Walshok, 1995).

With regard to developing countries, there are not many well-established mechanisms that the public and universities could use to keep in contact for communicating new ideas and the benefits of new knowledge production and its marketability for further economic prosperity. From Delanty (2001b) and Walshok (1995), it is clear that public involvement and dissemination of information to the public from universities are important to integrate the knowledge to be a part of social life and contribute knowledge for economic growth. But most people in developing countries do not have access to higher education and even in primary education the dropout rate is high before reaching the secondary or higher secondary level.

So it is also questionable how the connectivity between university and the public or even with businesses will be established and how the common people will have the perception that the interaction has a positive outcome for their social and economic life. In reality, most of them are uneducated and cannot grasp the educational opportunities because of poverty, inequality, unemployment, and lack of empowerment in developing countries like Bangladesh. So collectively, universities have a long way to go to maximize their role in the development of regions and nations. It is not only necessary to involve and engage the public but also to be concerned with the nature of research and sources of knowledge in good quality research (Delanty, 2001b; Etzkowitz & Leydesdorff, 2001; Gibbons et al. 1994; Walshok, 1995). Government should take initiatives to manage trainings and programs inside and outside of the country so universities can connect them with any updated knowledge and information to improve their research ability and quality to the standard and international level of the global society.

Shin and Harman (2009) argue that higher education is influenced by massification and globalization and it faces challenges such as growing competition among higher education institutions, financing, governance, curriculum, research and linkages, since there are socio-economic and political changes in the 21st century. With the concepts of massification and internationalization, they try to frame the current challenges with higher education based on some evidence in the Asia Pacific region and other places as well. They mention that egalitarianism and elitism as coexistence concepts facilitate access and massification. And globalization now has increased the competition between higher education institutions and the use of market mechanisms as trans-boundary. Education is now being considered as a service sector and knowledge is becoming the main determinant factor of economic competiveness in which globalization accelerates higher education in the knowledge-based economy. They argue that though Asian countries, New Zealand and Australia do not have very strong political and economic identities like European countries (the European Union), but they share commonalities, such as the fast growth of the higher education market internationally, as well as Asian countries having either Confucian traditions or a close tie with Britain or the USA. In conclusion, they suggested differentiating lower level higher education and an advanced research level. They also argue that the economic crisis beginning in 2008 will affect privatization due to more centralization of current governance referred to by them as "decentralized centralization". Higher Education Institutions (HEI) need to set up clear goals of internationalization and address social contributions with institutional rankings, particularly in academic research and policy making (Shin and Harman, 2009).

6. Integrative Approaches and Knowledge-based Development

There is still debate regarding the approaches that will be best fitted to analyze specific social problems. Therefore, there is now an emphasis on integrative research to cope with new kinds of problems. Before going

on to discuss and debate this, we need to understand the definition of multidisciplinary and integrative research and this will provide some sort of understanding regarding the use of these approaches. We then will try to incorporate how the understanding of these approaches contributes to knowledge-based development in developing countries. Integrative studies are projects that are either interdisciplinary or transdisciplinary, in that new knowledge and theory emerges from the integration of disciplinary knowledge. With the expression, integrative research, we summarize interdisciplinary and transdisciplinary research efforts (Tress, Tress & Fry, 2005).

In integrative research, academic participants such as researchers and nonacademic participants like societal actors -policy makers, representatives of administration or interest groups, locals or the broader public are involved (Tress, Tress & Fry, 2005). According to Tress et al. (2005), two types of actors – researchers and non-academic participants – can cooperate in different ways in integrative research. First, researchers from one discipline cooperate with researchers from other disciplines, which can be multidisciplinary or interdisciplinary, depending on whether integration is aimed at or not. Second, researchers from one discipline can cooperate with societal actors, which can be participatory. Also here, integration is not the aim but exchange. Third, researchers from several disciplines can cooperate with societal actors, which can be either participatory or transdisciplinary, again depending on whether the project aims at integration of knowledge or exchange.

Briefly, we can say that different kinds of knowledge come together to answer a research question using different kinds of approaches. Though social sciences, humanities, physical sciences and medical sciences use their own approaches to produce knowledge and analyze data, there still exists a debate between qualitative vs. quantitative analysis for data validation and exploitation. But in integrative research, the research questions or problems will be derived and articulated jointly where stakeholders will participate and try to answer research questions from different disciplinary approaches without depending on a single or particular aspect. There will be a high level of integration using the transdisciplinary and interdisciplinary approaches to answer any research question.

According to Tress et al, (2005), knowledge is used to solve a specific problem and new research will be used to sort out solutions for a given problem. If a given problem is solved by the existing knowledge, then it will be not a research project, rather a development project and so on. Specific knowledge can only be used to solve specific problems because it cannot be used even to solve a similar kind of problem. On the other side, generic knowledge is also used to solve specific problems. Researchers try to contribute in broader aspects to the development of method and theory in a conclusion of general relevance in which science progresses. In this way, generic knowledge increases the body of knowledge in scientific communities and the knowledge applicable to societal problems.

7. Social Sciences and Knowledge-Based Development

Knowledge is important and vital for institutional innovations necessary to adapt to the outcomes of technological innovation (Thompson, 2007). Rutton (2003) argues that scientific innovation needs social and political innovation in which innovation occurs as a result of the development of social scientific knowledge with the development of economic, political and cultural resources. As innovation is social, economic, political and scientific/technological, knowledge from social sciences needs to be incorporated into knowledge based development (Thompson, 2007). On the other hand, as universities are faced with the challenges of moving to the realization of the benefits of co-production of knowledge, social sciences can accelerate the social interaction and communication for innovation between experts and the public. The important point is that the production of knowledge is alive to the social circumstances where scientific and technological innovation is organized (Thompson, 2007). Kitagawa (2010) emphasizes the pooling of resources for describing an evolution of universities as a multilevel network. He includes different factors, such as collaboration between universities, research excellence and the nature of research areas, networking and links between researchers and institutional leadership, support and funding, power relations within research institutions and with external partners, such as industries and research councils. He mentions life sciences and physics, chemistry pooling for world class research excellence, hubs for meeting institutional, local, regional and international needs, and achieving diversified objectives of pooling diversified strategies, incentives and mechanisms. He argues to justify academic excellence through a process of pooling and quantifiable outcomes such as citations, publications, research grants, international collaborations, attracting more international students and excellent academic scholars through multi-level perspectives and strategic instruments for enhancing competition and research capacities in universities and at regional levels (e.g. Scotland attracts more international students and scholars in different scientific areas for research excellence relating to industry, and promotes knowledge transfer and exchange, and industrial placements of students). And in this way, research pooling affects a country's higher education through accelerated research funding and a long term strategy. There should be participation from internal and external

stakeholders such as researchers, students, teachers, industry, government, funding bodies and business partners (Kitagawa, 2010), as an integrative process and multi-level participation for economic and social development. He concludes that *"research pooling initiatives, being a form of inter-organizational network, can be seen as strategic processes whereby universities share resources and research facilities among selective partners. They reinforce selected specialized areas within disciplines by adding and pooling resources in order to make a critical mass of selected research excellence. Organizational strategies of actors/agents are shaping, and being shaped by, a wider structure. Scotland as a territory presents particular dynamics with the process of devolution in making new networks supported by public policy, creating resources for science and innovation and opening up global connections. Universities are developing as multi-scalar networked organizations at different spatial levels."*

From the above discussion, we understand that there also needs to be an incorporation of social science knowledge in knowledge based development in developing countries without concentrating on a specific boundary. Research problem formulation and suggestions to deal with a particular problem area is either social, economic or technological, and will be within the integrative approach and across the particular discipline employed. Socio-economic and political settings are important to accelerate knowledge-based development and to get economic return from this kind of development. Thus the integration of social sciences into knowledge-based development in developing countries should be highly appreciated and recommended mostly in developing countries like Bangladesh in a more interactive way between universities, government, business and public.

8. Conclusions

Knowledge-based development should not only be discussed in writings as a source of a contributing instrument to economic development, but it is also important how it could be fostered in developing countries in different social settings, in which deffrent economic, political and cultural ideologies have influence. It is still not well practised in developing countries to promote research in universities as a basis of knowledge production or creation and how this can contribute to economic growth and social well being. Though there are many intermediary factors, such as lack of investment, proper management, design of appropriate planning and public policy, and political instability, social values and economic circumstances influence how and to what extent the production of knowledge-based development in developing countries can contribute to economic growth. Thompson (2007) adequately mentions that scientific and technological development of a country is both dependent on social context and political context because the success of knowledge-based development varies according to the different social, economic and political environments. In this regard, integrative research incorporated with participation of different level stakeholders, i.e. academic and non-academic, might be influential in fostering knowledge-based development in developing countries. Government should take steps to make a link between universities, business and the public. In conclusion, knowledge should be interactive and exchangeable where feedback from experts accelerates the success of further advancement in economic and social development. Universities should play a vital role in developing countries, and in knowledge-based development in low income countries they should contribute to economic prosperity. These countries should consider and absorb developed country's ideas and knowledge at local and regional levels through an extensive consideration of their socio-economic and political context.

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