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The Role of Diaspora Entrepreneur in the Advancement of Science and Technology: Knowledge Economy Perspective

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1. Introduction

The industrial society brought with it a profound socioeconomic change that transformed the economy in many countries from largely rural societies engaged in agriculture to owner-centered societies engaged in the manufacture of goods (Al-Hawamdeh & Hart, 2002). Trends in world economy have clearly shifted towards a knowledge economy. In this instance, economic development calls more upon intangibles, i.e. brains, rather than tangibles, i.e. muscles, and productivity calls upon ideas, information and adaptive thinking. In view of this rising globalised knowledge economy, trans-national migrants are playing an increasing role contributing to demographic changes and answering to the competition amongst nations for skilled knowledge nomads.

Brain drain refers to the phenomenon of emigration of trained and talented individuals to other nations. This human capital flight is observed to have two key trajectories of migration: Firstly, the flow of brains from the developing nations to the developed nations, and secondly, from developed nations to developing nations. The first type of emigration is largely superior in numbers, to the latter. Emigrational trajectories can be characterised by diverse push factors and pull factors, respectively, from countries of origin and to recipient countries. Conflict, health hazards, troubled economy or a difficult political situation, contribute substantially to this flight. There is also the search for greener economic pastures and opportunity for intellectual recognition or simply the prospect to exercise capacities that may not find a demand or appreciation in the country of origin.

The phenomenon of migration of people differs from country to country, from time to time, and from mechanism to mechanism. For example, the emigration trajectory may have resulted from brain overflow, resulting in turn in brain spill over absorbed into foreign markets. The migration of this surplus brain constitutes an overflow and can, if strategically coordinated, provide solutions for the brain exporting country. Another example is the brain exchange, a temporary phenomenon whereby brain drain is compensated by corresponding brain gain. This could be in the form of exchange of scholars, researchers and/or scientists.

This international migration could thus profit developing nations through the economic network benefits created. The resource loss through brain drain could be converted into a long-term resource profit for the developing country. Within this perspective, the emigrated intellectual, skilled, technological elites would remain an invaluable resource for the development of their home country. Their contribution to economic development would be substantial through platforms of the knowledge economy, and *via* knowledge networks of global knowledge societies.

The question is how does Diaspora conserve and maintain these bonds? Skilled immigrants, scientists, entrepreneurs, technopreneurs and intellectuals may play a strong role in science and technology. Saxenian (1999) expressed the significant role of diaspora fostering science and technology driven innovation and economic progress in countries. The most powerful Diaspora mechanism could be defined by different degrees of connectivity, mobility, and interdependence of trans-national knowledge networks.

This chapter aims at highlighting the strong relationships between Diaspora Knowledge Entrepreneurial networks, Mother country and the host country in order to have win-win relationship, based on a strong supporting platform of Science, Engineering, Technology & Innovation (SET&I). This would in turn strengthen the STE&I platform rendering it an enabled and enabling platform.

The structure of this chapter is as follows: the second section discusses the diaspora, the definition and the impact of the diaspora that may play on the origin country and host country, also the rationale for thinking about how to make the diaspora take forward steps to be a part of the development. The third section discusses the entrepreneur and the main characteristics that are needed in order to have a quality entrepreneur especially among the diaspora. The fourth section discusses the diaspora Entrepreneur as a catalyst for the development under the umbrella of knowledge economy. The fifth section discusses science and technology as a core for the development, with a concentration view about the university and their linkages with industry and how diaspora can take this step to foster such a relationship. The seventh and last section introduces the framework that could be applied within many countries and especially needed in medium and low income countries, taking the most important elements; which is believed to make a development by enhancing science and technology within these countries.

2. Diaspora

2.1 Diaspora Definition, causes and facts

Diaspora refers to people or ethnic population that leaves their traditional ethnic homelands and being dispersed throughout other parts of the world. Influenced by push factors pull factors, this dispersion may have been a consequence of force or a consequence of reason. Either way, the Diaspora may retain reasons for bond with his/her country of origin.

More and more people choose to live outside their countries of birth. It was reported (IOM, 2006) that in 2005 migrants comprised 3.0 percent of the global population. There was an estimated 191 million migrants worldwide in 2005, up from 176 million in 2000. Illegal immigration is recorded by IOM to be the most rapidly growing form of human migration. Developed economies, particularly in the EU and US, face new challenges as well as opportunities in managing their immigration policies.

The countries hosting the largest number of international migrants in order of their Mother country, percentage of the worlds as expressed by IOM, (2006), migrant stock are: United States (20.0%), Russian Federation (7.6%), Germany (4.2%), Ukraine (4.0%), France (3.6%), India (3.6%), Canada (3.3%), Saudi Arabia (3.0%), Australia (2.7%) and Pakistan (2.4%).

Migration is rising in many OECD countries with temporary movement rising and foreign-born workers meeting skill shortages in rich countries. Statistics as reported by (UNDP, 2005), show that so many people in low and middle-income countries wish to migrate to more successful states, and that high-income countries, which have less than 20 per cent of the global labour force, now accommodate over 60 per cent of the world's migrants. Migrants who move from lower to higher income economies are often able to gain an income that is 20 or 30 times higher than they would be able to gain at home.

The type of policies a country offers will determine the type of immigrants or brains it attracts. Because workplaces encourage integration; countries must ensure that there are readily available jobs and housing. These two things give people a stake in society (Mehta, 2007).

Factors that encourage the migrant to move away from the home country are termed push factors. These may influence the individual on a temporary basis or, if related to discriminatory factors may conclude in permanent migration as seen in figure.1. Unstable politics-economic conditions and conflict are the main characteristics for such countries.

There are also factors that encourage an individual to consider migrating to a host country. These factors are termed pull factors. For example, in many industrialized states, the increasing competitiveness of the global economy has placed new pressures on both private and public sector employers to minimize costs and to maximize the use of cheap and flexible labour – precisely the kind of labour that migrants, whether they have moved in a regular or irregular manner, are able to provide. From another perspective, we can also witness the migration of large companies in search of cheaper labour force.

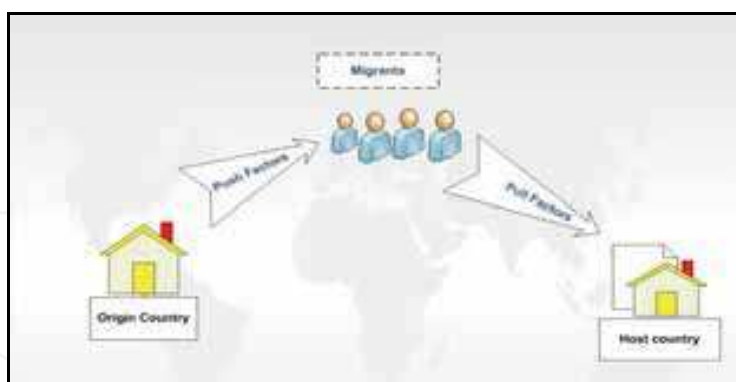


Fig. 1. Emigrational trajectories can be characterised by diverse push factors and pull factors, respectively, from countries of origin and to recipient countries

2.2 Diaspora and Country of Origin Development

Since Diaspora is any people or ethnic population that leaves their traditional ethnic homelands, being dispersed throughout other parts of the world and influenced by push factors or pull factors, the Diaspora may retain reasons for bond with his/her country of origin. The most obvious of these reasons would be family and a sense of 'national consciousnesses'. The Diaspora individual may safeguard links with family and friends, and

also retain positive attitudes towards the home country. He may also harbour a strong responsibility in contributing towards economic stability in the home country.

Lowell and Gerova (2004); and Johnson and Sedaca, (2004) represent some bonds between the diaspora and their origin countries like remittances, business investment, and knowledge transfer mechanisms undertaken by Diaspora. Orozco, (2004) mentioned that Diaspora impact on the origin country can be coined as the five Ts: tourism, transportation, telecommunications, trade, and the transmission of monetary remittances. Workers' remittances are an important source of income for many developing countries. Orzoco reports in Lowell paper (2004) that workers' remittances are the second-largest source of external funding for developing countries. While living costs are usually much higher in countries of destination, most migrants can still earn enough to support themselves and send remittances home to members of their household and community.

An excellent example of the mechanism used by Diaspora to participate in the development of the home country can be observed in the case of immigrants in America's high-tech Silicon Valley. A large number of the foreign-born entrepreneurs in Silicon Valley have business relations in their countries of origin. This linkage is often catalyzed by industry – university interactions. Another notable case is the Taiwanese Diaspora, which played a crucial role in developing the country's electronics industry.

These positive attitudes towards the home or origin country could however be dampened by a number of factors. Alienating circumstances of flight, or ethnic-religious discrimination in home country notwithstanding, factors that could prevent or inhibit their enthusiasm to remain in contact with the home country could include a negative attitude of home government towards Diaspora or political rejection of Diaspora by the home Government. Then again, an overly enthusiastic 'welcome' by the home Government via Return Programmes and the re-injection of knowledge Diaspora into the local knowledge platform could provoke a negative reaction by the local knowledge nomads, forcing the once Diaspora to again take flight.

Hence, how do and how could Governments facilitate this conservation of bonds between Diaspora and Home? A number of significant experiments are underway around the world to make effective use of Diasporas. The Swiss government has created a consulate (the Swiss House) in Cambridge, Massachusetts, to promote interactions between the Swiss in the Boston area and their counterparts at home. Swiss House was created in recognition of the importance of the area as the world's leading knowledge centre, especially in the life sciences. In addition to Harvard University and MIT, the Boston area is home to more than 50 colleges and universities and a cluster of biotechnology firms (UN Millennium project, 2005).

More and more attention is turning to possible opportunities that would enable developing countries to build international partnerships with the Diaspora. However, before even considering brain gain or spill-over mechanisms from Diaspora to home country, would it not be wise for the Government to firstly facilitate integration of Diaspora into the host country? This could be achieved through Government to Government understandings and efforts towards securing legal status in the host country; access to information, employment and banking facilities; access to welfare and pensions from home country and from host country; and, freedom of movement within host country. This would empower the Diaspora individual for participation in the reconstruction or development of the home country. Moreover, economic incentives or lack of disincentives for remittances and investments in

home country could further encourage the Diaspora – Home interaction. These interactions would require stable pathways or platforms. University – Industry linkages as an example of a pathway or mechanism that diaspora may play a strong role in, could provide a sustainable, flexible conduit for techno-entrepreneurs or knowledge nomads. These University – Industry linkages could be defined by different degrees of connectivity, mobility, and interdependence of trans-national knowledge networks. University-Industry linkages and the role that diaspora may take a place in such linkages will be discussed in a separate section in this chapter.

3. Diaspora Entrepreneur

Economic development, being a choice, is willed within an economy. It is strategically planned, pronounced and implemented, then closely monitored. Economic development occurs when local leaders choose to identify their comparative advantages, choose to invest in these and choose to draw out clear and realistic timelines of development. This thus enables individuals and industries to better compete. In the new century, the comparative advantage of an economy lies in the abundance as well as the quality of entrepreneurs instead of merely traditional inputs, such as labour and capital (Ming, 2005).

3.1 Who is Entrepreneur?

Trying to define Entrepreneur is not easy, although many have tried (Skrzeszewski, 2006).

An *Entrepreneur* as Ming (2005) states has become, in the new economic era that features advancement in technology, one element of economic development. Entrepreneurship is recognized as a major economic force, a major source of business and job development, and it has been identified as an effective tool for community and individual growth and change (Skrzeszewski, 2006). Entrepreneurs are usually the key actors in recognition, exploration and exploitation of new opportunities (Madsen and Fisker, 2004), guided by experience, knowledge, intuition, and a desire for freedom (Skrzeszewski, 2006). Hirich *et al.*, (2008) defined Entrepreneur as behaviour that comprises firstly, of initiative taking, secondly, of the organizing and recognizing of social and economic mechanisms to turn resources and situations to practical account, and thirdly, of the acceptance of risk or failure.

In the new century, the comparative advantage of an economy lies in the abundance as well as **quality of Entrepreneurs** instead of traditional inputs; such as labour and capital (Ming, 2005). Skrzyszewski, (2006) stated that Entrepreneurship in the nonprofits sector (for example, libraries) is based on increasing the organizational capacity to achieve goals rather than to make a profit.

Entrepreneurs can be motivated by money and profit, but they can also be motivated by a desire to bring about social, organizational, or community change. An Entrepreneur is different from a businessman as business investment is not the only sector that an entrepreneur can engage. Because entrepreneurship is an attempt to fill human needs, it is a more dependable source of solutions to societal problems or issues than are government-driven solutions based on political or bureaucratic need (Skrzeszewski, 2006) as seen in figure.2.

Entrepreneurship thrives on globalisation, it is allowed to thrive by national and international deregulation, and it is driven by the IT related communications revolution. In spite of all difficulties that are facing the Entrepreneur, Entrepreneurship is presently the

most effective method for bridging the gap between science and marketplace, creating new enterprise and bringing new products and services to the market (Hirich et al, 2008). Entrepreneurs, be they local or diaspora, have become a key element of economic development, success and sustainability.

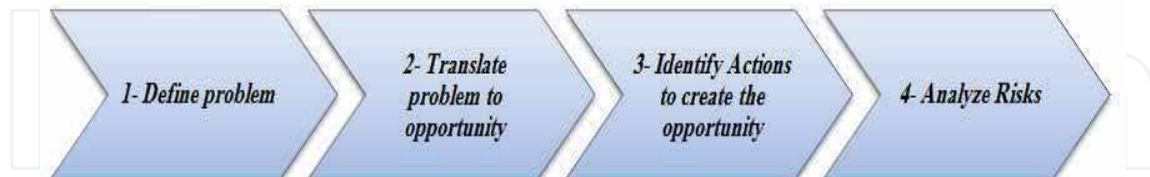


Fig. 2. The Models_ From Problems to Opportunities Adopted from (Skrzeszewski, 2006)

3.2 Diaspora Entrepreneur

The UN Millennium Goals Project (2005) mentions that globalizing forces such as connectivity, mobility, and interdependence have made it possible for Diaspora communities to strengthen their research and business connections to their countries of origin. These three elements should thus also catalyse Diaspora Entrepreneurship, in particular techno-entrepreneurship which allows technical trans-national spill over and propagation of knowledge intensity.

Houghton and Sheehan (2000) clearly state that knowledge has always played an important role in all economies, and this use of knowledge has been increasing since the Industrial Revolution. They go on to argue that, although there is nothing new about knowledge playing a role in economy, but the degree of incorporation of knowledge and information into economic activity is now so great that it is inducing quite profound structural and qualitative changes in the operation of the economy and transforming the basis of competitive advantage.

3.3 Knowledge Entrepreneur

Skrzeszewski (2006) states that a knowledge entrepreneur can be defined as follows:

“A knowledge entrepreneur is someone who is skilled at creating and using intellectual assets for the development of new ventures or services they will lead to personal and community wealth creation or to improved and enhanced services. The Knowledge Entrepreneur must have sufficient personal knowledge capital to be able to create value and/or wealth through the use of the knowledge capital”

Intellectual assets are intellectual material –knowledge, information, intellectual property, experience- that can be put to use to create wealth. It is, as Skrzszewski emphasizes, the sum of everything everybody in a company knows that gives it a competitive edge. These knowledge assets include skills, experience, expertise, culture, and awareness. However, to be useful in a practical sense, knowledge assts must also be formalized, organized, shared, and utilized in some productive way as depicted in (Figure.2) which provides a theoretical basis for the knowledge base of the entrepreneur (Skrzeszewski, 2006).

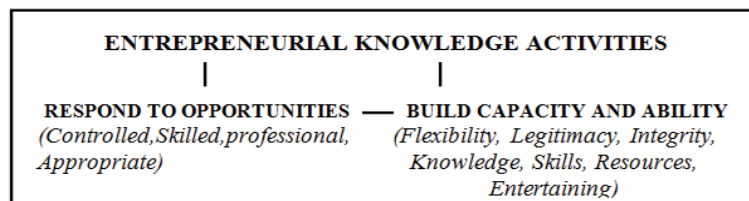


Fig. 3. Knowledge Entrepreneur Model
Source: (Skrzeszewski, 2006)

4. Diaspora Entrepreneurs A Catalyst for A Global Knowledge Economy

According to the United Nations Development Programme (UNDP), the proportion of the world's population living in poverty has fallen faster in the past 50 years than in the previous 500 years. Nonetheless, the gap between the rich and the poor continues to grow forcing an ever widening division between living standards in richer and poorer parts of the globe. In 1975, UNDP reported a per capita Gross Domestic Product (GDP) in high-income countries as 41 times greater than that in low income countries and eight times greater than that in middle-income countries. UNDP reports that today, high income countries have per capita GDPs that are 66 times those of low-income countries and 14 times those of middle-income countries.

4.1 Knowledge Economy

The industrial society brought with it a profound socioeconomic change that transformed the economy in many countries from largely rural societies engaged in agriculture to owner-centered societies engaged in the manufacture of goods (Al-Hawamdeh & Hart, 2002). Trends in world economy have clearly shifted towards a knowledge economy. In this instance, economic development calls more upon intangibles, i.e. brains, rather than tangibles, i.e. muscles, and productivity calls upon ideas, information and adaptive thinking. In view of this rising globalised knowledge economy, trans-national migrants are playing an increasing role contributing to demographic changes and answering to the competition amongst nations for skilled knowledge nomads.

'*Knowledge Economy*' refers to the overall economic structure that is emerging, whereby the balance between knowledge and resources has shifted so far towards the former that knowledge has become perhaps the most important factor determining the economic development and thus the standard of living. Today's most technologically advanced economies are truly knowledge-based (World Development Report, 1999). As such, today's most technologically advanced economies are truly dependent on their knowledge nomads. Sheehan and Tegart (1998) identify the rise in knowledge intensity of economic activities, and the increasing globalization of economic affairs as the two defining forces from which emerges the Knowledge Economy. The rise in knowledge intensity is being driven by the combined forces of the information technology revolution and the increasing pace of technological change. This increasing knowledge intensity involves both the increasing knowledge intensity of individual goods and services, and the growing importance of those goods and services in the economy. Hence, knowledge intensity and globalization are not only two forces, but two interdependent forces influenced by existing degrees of connectivity and mobility of the knowledge nomad.

Hargreaves and Shaw (2004) explain that Knowledge economies work best when they are developed in conjunction with knowledge societies. These are societies that recognize their knowledge elites and uphold the emergence of potential elites, promoting mechanisms geared towards spin-off benefits and social dividends for the broader civil society. This is accomplished without 'burn-out' of the knowledge elite, or hindering his process for continual exploration and expression. Diaspora techno-entrepreneurs, whether being temporary or permanent Diaspora, weave themselves through trans-national knowledge societies.

Hence, the basis of a knowledge economy is a learning society (Hargreaves and Shaw, 2004). Economic success and a culture of continuous innovation depend greatly on sustaining a continual education and innovation process. According to OECD, successful knowledge economies rely on four sources of innovation: Scientific and technical knowledge; Interactions and incentives to innovate among users and doers; Decentralized modular patterns of innovation within a coordinated system; and, Widespread application of information and communication technologies, in education.

4.2 The Entrepreneurial Network

Burt (2000) provides a comprehensive account about Network theory with entrepreneurship perspectives. He submits that a player (Entrepreneur) with a network rich in information enjoys a number of benefits from: i) contacts established in the places where useful bits of information are available, ii) a reliable flow of information to and from those places. Burt (2000) explains that networks could be modelled in two different routes. The first route describes the networks as the actor accesses people with specific resource, creating a correlation with the actor. The second route involves the networks themselves which are seen as a resource, because they allow the actor better access, better timing and better chance for referrals. The first line describes the networks as a conduit, while the second line describes how networks are themselves a form of social capital (Burt, 2000). An understanding of the two routes is vital since Diasporas originate from different countries with different characteristics.

4.3 Knowledge Entrepreneur Network

Al-Hawamdeh & Hart (2002) have noted that the essence of the Knowledge-based Economy is the capacity to absorb, process, and apply knowledge or intellectual property and translate it into a key source of competitive advantage together with the basic factors of production, which continue to be important in the Knowledge-based Economy. The emphasis is toward intellectual capital or knowledge as a source of value and wealth creation (Al-Hawamdeh & Hart, 2002). So the richer country will be the country with high numbers of Intellectuals and educated people. Ultimately, the basis of a knowledge economy is a learning society (Hargreaves and Shaw, 2004). Economic success and a culture of continuous innovation depend greatly on sustaining a continual education and innovation process.

There is no doubt that brain drain is a big problem, but it can act as a safety valve to relieve the pressure of a pressing problem rather than to resolve it. As mentioned by Borta (2007) the safety valve happens for the reasons that migration affords the skilled workers with individual exits such as: it facilitates the export of the unemployment problem for skilled

workers; and it alleviates the pressure to change the structural barriers to improving the business climate in order to return the benefits also to the origin country. Generally, by attracting highly educated workers, recipient countries could first and foremost expect a positive impact on economic output in both absolute and in per capita terms. Clearly, an increase in the population generates positive outcomes on supply capacity and demand, which will result in output gains (Borta, 2007). The core issue is how the Diaspora could play a win-win role facilitating development in both directions, toward the origin country, and from the recipient country.

Let us look at the impact of brain drain on origin countries. Brain drain economic impact on each origin country depends on many circumstances—among them the skills and former employment of migrants, the history of migration (the existence and location of a large Diaspora), the sectors affected, patterns of trade and production, the investment climate, and the size and geographical location of the country. Origin countries may face both favourable and unfavourable consequences from brain drain. Typically, migrants are better educated, younger, and more mobile than the majority in their country of origin. That's why origin countries may not only lose an important amount of their well-educated domestic work force, but also some of their innovative and motivated youth. Considerable out-migration could lead to both a brain drain and a youth drain also from poorer countries. Borta (2007) mentioned that in some instances, highly-skilled emigration has a negative impact on living standards of those left behind and on growth. This is because: (a) those left behind in the home country may suffer because they lose the prospect for training and mutually beneficial exchanges of ideas; (b) the provision of key public services with positive externalities, such as education and health, may be damaged; (c) opportunities to achieve economies of scale in skill-intensive activities may be reduced; (d) society loses its return on high-skilled workers educated at public expense; and (e) the price of technical services may rise. This means, that if highly educated workers would stay in their countries, they could help to improve governance, improve the quality of debate on public issues, encourage education of children, and strengthen the administrative capacity of the state—contributions that would be impaired in the case of brain drain. However, due to the ongoing debate about brain drain impacts on origin countries, many studies have emphasized some potential gains from brain drain occurrence.

The return of skilled workers to their home country is a positive occurrence because they may be more efficient than foreigners in transferring knowledge back home because of their understanding of local culture, but most of the studies show that most of people who are leaving their home lands looking for better situations rarely returning back, other studies from IOM indicate that thirty percent of students who are studying overseas return back to their home lands. In the case of countries facing dangerous situations such as war or conflict, the Diaspora may be restricted re-entrance into their origin countries. The concern related to this group of people is that they may carry a deep feeling towards their origin countries and are burdened with the incapacity to channel assistance or to participate in origin country development.

Two key notions were discussed in detailed by (Kuznetsove *et al.*, 2003), in order to include the Diaspora as a part of the development; (1) Open migration chains are sequences of educational or job opportunities, which allow a migrant to move to progressively complex educational and job tasks necessary to work in the global environment. (2) Diaspora networks (or expatriate networks) are the locus of concerted action by expatriates to

promote their collective interests or to help them engage in their home countries. *The question is what would we expect from Diaspora?*

It is well known that expatriates have played a critical role in accelerating technology exchange and foreign direct investment in the economies of India, China and Israel. They have frequently taken the role of pioneer investors at a time when major capital markets regarded these economies as too risky (Kuznetsove *et al.*, 2003).

The networks utilized by migrants vary considerably depending on local histories of migration, national conditions and communal socio-cultural traits (Wong *et al.*, 2007). There has been shown to be qualitative variation in types of networks used by different occupational classes (Wong *et al.*, 2007). High occupational groups, for instance, rely more on networks of colleagues or organizations and less on kin-based networks than unskilled workers. In any case, 'The forms and characteristics of these networks may depend on their composition - friends, relatives, kin, acquaintances, professional colleagues, etc.,' Meyer (2001) observes, 'but the result is similar: most positions are acquired via connections (Wong *et al.*, 2007).

Hence, we could expect Diaspora to play a strategic and systematic role in technology exchange, in facilitating direct foreign investment, and also in the identification and penetration into reliable knowledge and business networks.

Another important question is, how do we attract Diaspora, or otherwise, how do we play the Brain Gain Game? Since the onset of the 1990s, skilled labour migration has been a burgeoning and ever developing field of research. Here, skilled migrants - most broadly defined as those in possession of a tertiary degree or extensive specialized work experience - include architects, accountants and financial experts, engineers, technicians, researchers, scientists, chefs, teachers, health professionals, and - increasingly - specialists in information technology (IT, including computing professionals, computing engineers, managers, sales reps, etc.) (Wong *et al.*, 2007) It would be these areas and fields of expertise that we would need to focus on.

According to Kuznetsov and Sabel (2006), in this 21st century marketplace, knowledge is recognized to be the most important factor in economic development; the richer countries compete to attract and retain the world's best-trained minds in many ways. The more influential "pull" factors of professional migration are envisaging effective policies that stimulate R&D activities and increase direct investment, offering attractive postgraduate training and research opportunities, and recruiting younger graduates and professionals (Borta, 2007). University is obviously a critical factor in the "Brain gain" game. Their linkages to industries, local or global, would determine the intellectual drive and momentum for innovation.

5. Science, Technology and Innovation

The knowledge economy is founded on a learning society. Investment in science, technology, and innovation education **has thus become the most critical source of economic transformation** in newly industrial countries. This transformation that is equally dependent on access to information, intellectual development and knowledge nomad mobility. These can only be achieved if the knowledge networks are in place. Only then can the nation foster an infrastructure of linkages among and between firms, universities and government and thus gains competitive advantage through quicker information diffusion and product deployment.

5.1 Science and Technology for development

Science is a driver of technology and economic prosperity. Certainly in the twentieth century, science and technology have been linked. The clear example is the tight link between advances in nuclear science, atomic weapons, and nuclear generation of electric power. Basic science can be perceived as a vast reservoir upon which creators of technology can draw for ideas and knowledge.

In today's reality, most advances are only made possible by complementary advances in other enabling sciences and technologies. All science and technology advances rely on excellence in and developments made in the basic sciences, especially those of physics, chemistry, and biology. Therefore, excellence in the basic sciences must be maintained to support S&T advances in all disciplines and to support the development of applications.

Today the initialize S&T (for science and technology) is common in policy papers and journal articles; the two are thought of as a continuum. Michael Porter (1991) believes that part of government's role in stimulating innovation is to invest in basic research as well as in educational systems and infrastructure, although he clearly states that such investment must be consciously advanced and specialized.

Science and technology exert a growing influence on society and the economy. Scientific achievements continue to expand the frontiers of knowledge and increasingly contribute to the technological progress that affects how people live and work.

Scientific advances and technological change are important drivers of recent economic performance. The ability to create, distribute and exploit knowledge has become a major source of competitive advantage, wealth creation and improvements in the quality of life. Science, technology and innovation are now seen as keys to improving economic performance and social well-being. However, if governments want to obtain the benefits from this transformation they will have to put the right policies in place. Limits on public spending, increased competition and globalization, changes in the drivers of the innovation process, and a better understanding of the role played by science and technology in economic performance and societal change, have led governments to sharpen their policy tools (OECD, 2000).

The inherent function of the scientific endeavour is to carry out a comprehensive and thorough inquiry into nature and society, leading to new knowledge. This new knowledge provides educational, cultural and intellectual enrichment and leads to technological advances and economic benefits. Promoting fundamental and problem-oriented research is essential for achieving endogenous development and progress. UN, (2002) in its publications also confirms that, Governments, through national science policies and in acting as catalysts to facilitate interaction and communication between stakeholders, should give recognition to the key role of scientific research in the acquisition of knowledge, in the training of scientists and in the education of the public. Scientific research funded by the private sector has become a crucial factor for socio-economic development, but this cannot exclude the need for publicly-funded research. Both sectors should work in close collaboration and in a complementary manner in the financing of scientific research for long-term goals.

Science is an engine for development. Today, more than ever, science and its applications are indispensable for development. All levels of government and the private sector should provide enhanced support for building up an adequate and evenly distributed scientific and technological capacity through appropriate education and research programs as an

indispensable foundation for economic, social, cultural and environmentally sound development. This is particularly urgent for developing countries. Technological development requires a solid scientific basis and needs to be resolutely directed towards safe and clean production processes, greater efficiency in resource use and more environmentally friendly products. Science and technology should also be resolutely directed towards prospects for better employment, improving competitiveness and social justice. Investment in science and technology aimed both at these objectives and at a better understanding and safeguarding of the planet's natural resource base, biodiversity and life-support systems must be increased. The objective should be a move towards sustainable development strategies through the integration of economic, social, cultural and environmental dimensions.

Science and Technology needs, however, to also be enabled, that is to be nurtured and strengthened. This can only be achieved through education and capacity building. Investment in science, technology, and innovation education has been one of the most critical sources of economic transformation in the newly industrial countries. Such investment should be part of a larger framework to build capacities worldwide. The one common element of the East Asian success stories is the high level of commitment to education and economic integration within the countries. This strategy was a precursor to what have come to be known as knowledge societies (World Bank, 2002).

The **industrial** sectors that invested more in research and performed more innovative activity are those that employed a larger share of higher skilled workers ... increased up skilling is thus not merely a consequence of some labour-based technological shock. Economic success and a culture of continuous innovation depend on the capacity of workers to keep learning themselves and from each other. According to OECD, successful knowledge economies rely on four sources of innovation: Scientific and technical knowledge; Interactions and incentives to innovate among users and doers; decentralized modular patterns of innovation within a coordinated system; and, Widespread application of information and communication technologies, including in education.

5.2 Diaspora and University-Industry Linkages

Firms can acquire knowledge and technology from many external sources. Mueller (2006) explains these sources include competing firms, research organizations, government laboratories, industry research associations, and universities. Universities are unique in terms of their potential. **Not only can a firm obtain knowledge and technology, but it can also recruit graduates and faculty to serve as employees and consultants.** While much of inter organizational literature focuses on the collaboration between two or more industrial firms, we concentrate on industrial firm and university collaboration.

Knowledge spill over allows other economic actors to exploit the newly created knowledge as well as resulting in an acceleration of economic growth (Mueller, 2006).

Regions with a high level of entrepreneurship and university-industry relationships experience, has greater productivity and economic growth, this is what Mueller (2006) mentions as a results of the econometric analysis.

So, **University** have to spot a formal relationship with the industry, even for bilateral benefits. The last 20 years or so have seen a growing demand for universities to be beneficial to their environment in a more direct and immediate way than before. University-industry co operation gained increased attention in different western economies in the 1980s as

Geisler (1993) mentioned. Governments, universities and industry were developing different models in technology transfer. More funding was targeted into university-industry cooperation. In addition, university-industry relations were seen as critical for innovation, new product commercialization and industrial competitiveness (Geisler, 1993). Knowledge networks consist of groups of expert institutions working together on a common concern, strengthening each other's research and communications capacity, sharing knowledge bases and developing solutions that are made available for use by others outside the network (Cole *et al.*, 2001).

5.3 University networks for sustainable development

Government policies, in terms of science and technology, industry, and education, will need new emphasis in a knowledge based economy. The term technology is used broadly in business and science to refer to the process of transforming basic knowledge into useful application (Day & Schomaker, 2000). Science might be thought of *know-what* and technology as *know-how*, while markets or business focus on *know-where* and *know-how* (Day & Schomaker, 2000). The central workforce in the knowledge society will consist of highly specialized people (Al-Hawamdeh & Hart, 2002); these people could be gained from the diaspora. Emigrated intellectual, skilled and technological people are an invaluable resource for the development of their respective home countries. Their contributions to economic development are substantial through platforms of the knowledge economy, and *via* knowledge networks.

The position of the university consortium in the centre of the auto-learning society and with the responsibility to be hub in development processes may seem a bit pretentious. However, no other institution has the potential to fill this role equally well. Universities offer the academic space necessary to critically assess research results and address overarching issues such as democracy, social responsibility and corruption, regardless of religious, political or national backgrounds. Few, if any other institutions are able to offer similar conditions for free and unbiased discussion of development and progress. Universities can establish bonds and partnerships across technological, commercial, cultural, religious and political borders to the benefit of students, faculty and society. Taking the role as development hub is possibly a challenge that universities should face more willingly and consciously than in the past. Figure.4 may help to challenge the habits and existing paradigms and devise new paths for development.

There may be other stakeholders involved than those shown in figure 4, for example, other research institutions in both recipient and donor countries. However, universities and university consortia seem indispensable in the auto-learning context, because they are responsible for education of future decision-makers in the society. The question is not university participation as such, but what approach and type of partnership to establish and how to include local and international university networks to the mutual benefit of each participating country.

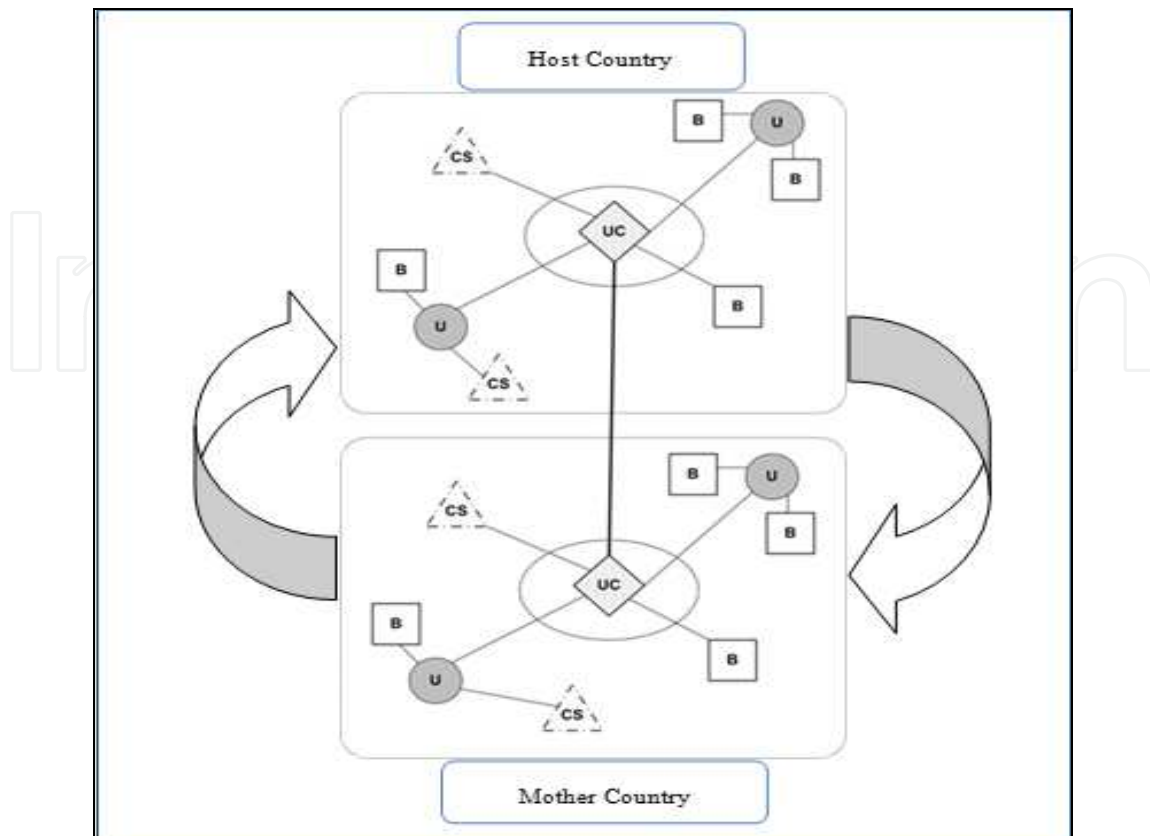


Fig. 4. University consortia (UC) as development hubs in national, Regional and international partnerships consisting of private and public Enterprises (B) as well as civil society (CS) U is individual university. Adopted from (Hansen and Lehmann, 2006).

Knowledge is recognized as a crucial element of economic growth in addition to physical capital and labour (Mueller, 2006). Also Hansen and Lehmann (2005) argued that, Universities educate decision-makers of tomorrow in both public and private sectors. To do this they are dependent on a bottom up supply of students and the national primary and secondary education systems must be maintained and tuned accordingly. It is also necessary for universities to have well-developed contacts to business and other groups in society in order to be able to identify needs for research as well as competencies and numbers of graduates to fill present and future positions. In doing so, universities are obviously indispensable partners in what could be identified as a bottom-up and demand-driven development process. Universities, however, must also be independent institutions in terms of defining areas of research that they consider important for the sake of seeking new knowledge and understanding, even in the absence of any immediate applicability or demand from government, business or civil society. This freedom of choice is important in a long term perspective because of the inherent uncertainty associated with scientific research: we cannot know for sure which parts of what we know or learn today will also be valuable tomorrow. Additionally, open science and open access to knowledge facilitates independent replication of scientific results; enhances the generalization of results; avoids excessive duplication of research; increases the possibility for useful ideas, products and technologies; and realizes for these reasons the social value of knowledge (Foray, 1997).

This may run counter to other criteria such as political correctness or immediate technological or economic relevance. But free research and inherent learning and education are necessary degrees of freedom in any democratic and innovative society and must be fostered and supported by governments and universities. Also recent empirical studies as quoted in Mueller (2006), (Plummer and Acs, 2005; Acs and Varga and Schalk, 2004) have shown that knowledge spill over positively affect technological change and economic growth.

On this background, international university networking is necessary in order to create structured bases for education and research and promote auto-learning societies (enhanced NIS). In a global context, university networking is one important contribution to capacity building with the aim of achieving sustainable development of human and material resources. This viewpoint is in accordance with recent statements by the World Bank regarding tertiary education as an indispensable means of constructing and maintaining knowledge economies and democratic societies (World Bank, 2002). It is also in harmony with the Union of Industries and Confederation of Employers in Europe, which expresses the need of business as a driving force towards sustainable development (UN, 2002). And, it is in good accordance with the results of the World Summit in Johannesburg in 2002.

6. A framework for middle and low income countries

Government policies, in terms of science and technology, industry, and education, will need new emphasis in a knowledge based economy. The term technology is used broadly in business and science to refer to the process of transforming basic knowledge into useful application (Day & Schomaker, 2000).

Science might be thought of *know-what* and technology as *know-how*, while markets or business focus on *know-where* and *know-how* (Day & Schomaker, 2000). The central workforce in the knowledge society will consist of highly specialized people (Al-Hawamdeh & Hart, 2002); these people could be gained from the diaspora. Emigrated intellectual, skilled and technological people are an invaluable resource for the development of their respective home countries. Their contributions to economic development are substantial through platforms of the knowledge economy, and *via* knowledge networks. The core issue is how the Diaspora could play a win-win development in both directions, toward the origin country, and from the recipient country. Bridgstock *et al*, (1998) stated that Science is always the product of human activity; this is one reason why it is important to study science, Technology and society. Different societies and different cultures need to build bridges or even as called by many scientists the highways between these different societies. The knowledge entrepreneur who has these unique opportunities can build these bridges, since he carries his nationality within his blood, and stay in the host country where he gains the new knowledge and serves as a new blood in the host country.

Many networks could be created, even without waiting for policy to mobilize them, while these networks could be more efficiently and more precisely to the needs on the origin country if the entrepreneur takes the step to create networks.

The phenomenon of migration of people differs from country to country, from time to time, and from mechanism to mechanism. For example, the emigration trajectory may have resulted from brain overflow, resulting in turn in brain spill over absorbed into foreign markets. The migration of this surplus brain constitutes an overflow and can, if strategically

coordinated, provide solutions for the brain exporting country. Another example is the brain exchange, a temporary phenomenon whereby brain drain is compensated by corresponding brain gain. This could be in the form of exchange of scholars, researchers and/or scientists especially from middle and low income countries.

This international migration could thus profit developing nations through the economic network benefits created. The resource loss through brain drain could be converted into a long-term resource profit for the developing country. Within this perspective, the emigrated intellectual, skilled, technological elites would remain an invaluable resource for the development of their home country. Their contribution to economic development would be substantial through platforms of the knowledge economy, and *via* knowledge networks of global knowledge societies.

Knowledge networks consist of groups of expert institutions working together on a common concern, strengthening each other's research and communication capacity, sharing knowledge bases and developing solutions that are made available for use by others outside the network (Cole et al., 2001).

IOM, (2006) noted that, a successful co-operation means, to some degree, overcoming these differences. The network approach suggests that a long-term relationship between organizations is a cumulative process that produces means of difference reduction. The elements that emerge in relationship are described as bonds. Mattsson (1985) classifies the bonds between inter organizational exchange as follows: Technical bonds, Time related bonds, Knowledge related bonds, Social bonds, Economic bond and Legal bonds. Also, several models have been tested or used. They may be unsuitable in certain countries and communities that have less stable political and/or economic landscapes. For countries where a sizeable proportion of their populations are residing abroad, there should be a model or a strategy to harness the potentials of the Diaspora through, for example, the establishment of knowledge Entrepreneurial networks, in order to obtain win-win relationship for all parties.

The framework proposes to create diaspora Entrepreneurs through opportunities of funding and support. This Entrepreneur will be the core that would connect all elements of the framework together, inside origin country or the Diaspora.

The framework addresses Binary Economy which envisages any individual to have his own capital assets and labour. The criteria for selecting the **project and economic sector** that receives government support should include job creation potential, the degree of forward and backward linkages, export potential, and the ability to survive.

There is an obvious call on medium and low income countries to **consolidate and build on the institutional science, engineering and technology capacity for greater economic benefit** in a multi-disciplinary approach. **Mobility** of researchers and access to **training facilities** for senior and especially young scientists is thus fundamental.

International co-operation in science, technology and innovation is indispensable for medium and low income countries in this context in different directions:

- To absorb knowledge from around the world for the development of a sound science and technology base and domestic innovative capacity,
- To assimilate the know-how through learning by doing and learning by research (including management skills),

- To enable diaspora to produce innovative products (material or immaterial) for the international market, meeting international standards and, thus, ensuring sustainable development.

Employment generation programs can also be jointly established, provided they are designed in ways that make them contribute to social and economic development.

The collapse of barriers to the flow of **goods and services, capital and labor** has not always been orderly and has proceeded at different speeds in different parts of the world. But it is now virtually **universal in scope**. Also with reduced transport costs, **location is becoming less important** and political and economic stability, a well-trained labor force, and strong institutional underpinnings are emerging as the key drivers of prosperity. **No meaning for borders**, nothing can stop the development if there is a strong brain force behind all these.

Diaspora entrepreneur as seen in figure 5, can be an important source of investment for the origin country economy. Diaspora entrepreneur can play an important role in reconnecting the medium and low income countries economy to the whole world. **Embassies** represent the government in each country.

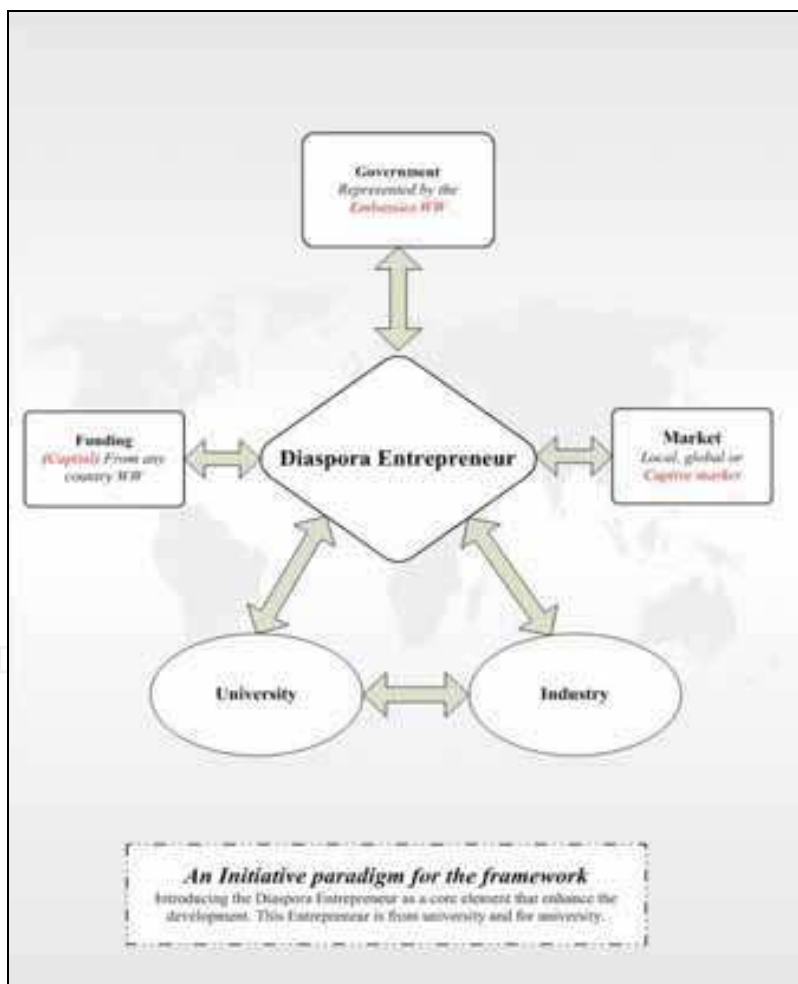


Fig. 5. Diaspora Entrepreneur framework for medium and low income countries.

Their role would include naming the policy, giving Legitimacy, monitoring the project, enhancing research, helping in finding funds, etc. As Diaspora is found all over the world, it

gives this framework a unique opportunity or strength. That is, the *Framework for University-Industry Relationships for the Advancement of Science and Technology as an Enabled and Enabling Force in medium and low income countries* can be applied in any country in the world that hosts the Diaspora community.

7. Conclusion and future research

This study aims at building a framework for stronger relationships between Diaspora Entrepreneur and the origin country, based on a strong supporting platform of Science, Engineering, Technology & Innovation (SET&I). Within this context, Science and Technology are perceived as an enabling platform. However, before being so, this platform must be enabled.

The framework that emerges from this study is hoped to be applied for medium and low income countries and by diaspora. It is deeply believed that many benefits would materialize, in the form of spin-offs, spill-over, and many other relations.

Since human resource is the capital resource, then the framework must start at this point and end at this point. Hence, diaspora Entrepreneurship worldwide is the goal; Embassies are the vehicle, and entrepreneur in the Diaspora, the catalysts.

Many Diaspora students around the world carry in their hearts a deep hope to return home, to create and to reap opportunities in the homeland. This hope is carried by this the framework. Connecting with these diaspora students becomes essential.

This study is a part of an ongoing research about Palestinian diaspora focusing on the impact of knowledge Entrepreneurial networks as a driving force in economic development. Such a strategy was created in order to help the Palestinian diaspora to be connected to Palestine, since the majority of the Palestinian people (more than 50%) reside outside Palestine.

If developing countries wish to move forward on a strategy that can be implemented, then this strategy would need to be flexible, adaptable and feasible in its requirements. The strategy of harnessing the talents of diaspora must be seen as integral to the overall efforts of developing the economies of these countries. Without political commitment, these efforts will flounder. We are confident that the issues presented in this chapter underscore the potentials as well as challenges involved in tapping the diaspora networks.

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From 3rd to 5th March 2008 the International Association of Technology, Education and Development organised its International Technology, Education and Development Conference in Valencia, Spain. Over a hundred papers were presented by participants from a great variety of countries. Summarising, this book provides a kaleidoscopic view of work that is done, all over the world in (higher) education, characterised by the key words 'Education' and 'Development'. I wish the reader an enlightening experience.

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