

Knowledge-Based Economy Transformation

A GCC Converging Strategy In-Need

Haytham Abduljawad, PhD

Knowledge to Power Consulting

Affiliated with Creighton University

info@knowledge2power.com

haythamajawad@hotmail.com

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Abstract

This paper argues that for the Gulf Cooperation Council (GCC) states to achieve their visions in transforming their hydrocarbon economies to knowledge-based ones, they need to consider the opportunities associated with converging their individual state's strategies into a regional strategy that leverages advantages and opportunities while address the weaknesses and threats that each state faces. This paper introduces a conceptual framework for innovation that highlights the roles of key actors in the transformation process to a knowledge-based economy. The Paper also presents the concept of University-Industry-Government (UIG) collaborations, based on the Triple-Helix innovation model, to emphasize the need of building the right capacities to allow for growth in developing economies such as in the GCC region. Knowledge creation and flow drives innovation within a national economy, which is a dynamic and complex process that involves many different actors. Using lessons and insights from a case study research in 2013 on the state of Qatar, this paper aims to inform policy-makers concerned with evaluating the effectiveness of UIG partnerships in their respective countries and identifying ways to improve them. However, it is vital to note that in the GCC region, effective UIG partnerships require strategies that focus on fundamental issues, some of which are prerequisites, while others are needed to sustain the outcomes of such partnerships.

Keywords: Knowledge, Knowledge-Based Economy, Innovation, Transformation, UIG Partnerships, Collaboration, GCC region

Introduction

"Coming together is a beginning, staying together is progress, and working together is success."

— Henry Ford

Due to recent global economic shifts resulting from changes in oil prices and the associated repercussions for oil-producing countries in the Gulf Cooperation Council (GCC) region as developing economies, this paper will explore the urgent need for a change in policy to converge states' individual strategies to create the much-needed critical mass for regional innovation strategy.

GCC states have many similarities in terms of language, religion, environment, and cultural values, they also share, for the most part, a similar foundation element in their economies. They all rely on hydrocarbon products, to various degrees, and many derivatives such as petrochemicals and natural gas. In 2015, the price of oil sharply began decreasing, due mainly to geopolitical reasons. Although GCC states play a role in geopolitical dynamics, they, however, have no direct control over the direction and slope of such changes in terms of how they manifest in oil prices. Therefore, it is crucial for these states to expedite their existing efforts to transform their energy resource-driven economies into knowledge-based economies that benefit from accumulated wealth over the past few decades.

As economies of the developed world demonstrate, increasingly greater growth based on knowledge-based goods and services, the GCC region can play a vital role as a collaborator as well as a leader in its own right, especially in the energy sector. Key challenges in terms of education, innovation, and supporting government policies will affect the future growth of their development and economic progress. Therefore, it is recommended that GCC states should

focus more on collaborating with other developing and innovation capacity intensive economies, specifically in Asia, which is home to a large percentage of highly educated and industrious knowledge workers and professionals. More importantly, these countries have been and still are progressing in their endeavors to transform their economies, which is a different learning experience from collaborating with developed economies that are endeavoring to improve upon and sustain their economies. Each scenario requires different planning and execution strategies to achieve the objective, and taking examples from developing nations, such as those in Asia, may be more appropriate for GCC states to learn how to adapt and adopt diversification policies.

This paper provides lessons and insights to inform policy-makers concerned with evaluating the effectiveness of UIG partnerships in their respective countries and identifying ways to improve upon them. However, effective UIG partnerships in the GCC region require strategies that focus on fundamental issues, some of which are prerequisites to sustain the outcomes of such partnerships. GCC states are continuing to carry out significant education reforms, which is key to the success of any strategic initiatives that aim to achieve their ambitious visions. While these reforms have improved the education systems in these countries, they however, need to assess and evaluate the impact of these reforms on education outcome. These reforms should, first, include basic education and not be limited to higher education. Second, the ultimate goal of reform is to align education practices in primary and secondary schools with higher education systems to better serve the local, national, and regional economies. If the current gap between basic education school systems and higher education is not urgently addressed, ill-prepared entrants will always disadvantage higher education.

Therefore, it is crucial that the ongoing reform efforts address the needs of higher education and mitigate the perception of industry regarding the education system and the

perception that school systems lack key competencies that industry requires, especially among the national universities and their national students. The second challenge is that the majority of higher education specialties lack advanced practical hands-on experiences because of inadequate laboratories or R&D facilities. This generally has an impact on how industry trusts the credibility of student assessments, and subsequently the quality of the education and knowledge base of graduates.

The paper introduces a conceptual framework for innovation that highlights the roles of key actors in the transformation process. Although the scope of this paper is limited to the university-industry-government (UIG) partnership, the proposed conceptual framework (Figure 1), however, examines how human capital development, social capital, and intellectual property management moderates the output of the UIG partnership. It scrutinizes how this partnership contributes to a national innovation system in an emerging knowledge-based economy (KBE). The conceptual framework highlights the UIG partnership as an antecedent to the national innovation system in a transforming KBE.

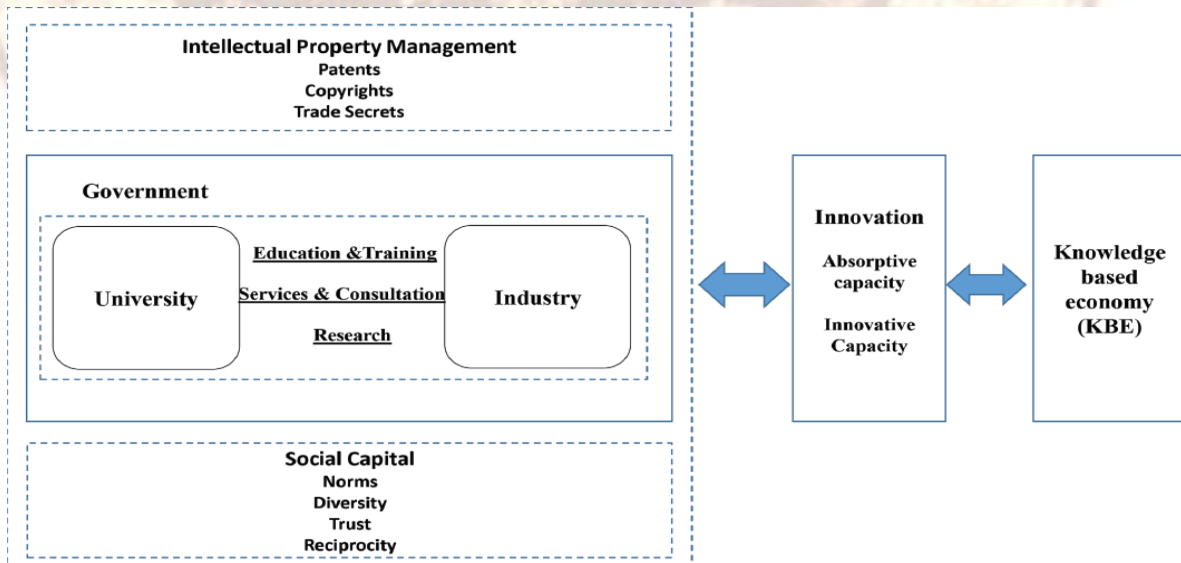


FIGURE 1– Framework for Transformation to a knowledge based economy

University Industry Government Partnership

University-Industry-Government (UIG) partnerships are based on formal and informal relationships among different actors. The purpose of these partnerships is to increase and focus the quality and quantity of knowledge assets created as a result of these partnerships to meet the needs of all concerned in the economic ecosystem of an organization, a nation or a region. Knowledge assets refer to tangible and intangible assets, and while many nations and economies focus on tangible assets to sustain their growth, knowledge-based economies (KBEs) seem to focus more on intangible assets, which requires the development of different capacities. UIG partnerships are strategies to build capacities that will ultimately lead to knowledge tangible assets. The transformation to a KBE demands a change in the roles, character, and relationships of knowledge organizations that comprise the innovation landscape (Porter & Stern, 2002). Knowledge organizations include universities, businesses, and government institutions. In a KBE, universities, industry, and government organizations play crucial roles in stimulating innovation through policy definition, business activities, and knowledge creation and exchange (Hu & Mathews, 2009).

This Paper will introduce the concept of University-Industry-Government (UIG) collaborations while emphasizing the need to focus on building the right capacities, through various linkages to allow for growth in developing economies such as in the GCC region.

Models of UIG Partnerships

Etzkowitz and Leydesdorff (1995) proposed a national level innovation framework as a model for the complex system of collaboration and cooperation among the three UIG institutions. The Triple Helix framework has been widely adopted in developed countries such

as USA and Singapore, to improve knowledge creation and exchange, and to maintain the sustainable development and integration of universities and industry (Leydesdorff, 1997). The Triple Helix framework has evolved over the years and exists in multiple models.

The first model is the “statist” Triple Helix, depicted in Figure 3.2, where government assumes more of a dominant, top–down approach, and a directing role over the other institutions. This model represents existing partnerships in the GCC region. With the limited role small and medium enterprises in the GCC region, most industry organizations involved in partnerships with universities are either fully owned and operated by government institutions, such as ministries and supreme councils. Or organizations fully owned by governments but independently operated, such national oil and gas companies, airlines and healthcare systems to name a few. There are advantages to this model in a context like that of the GCC region. Financial resources and policies are easily allocated to develop these partnerships. The disadvantages of this model in the GCC model, is the level of commitment to the development of these partnerships to stimulate economic growth. It appears that the handful partnerships in the region are created as a corporate social responsibility and a way to influence global ranking. The role of government in coordinating relationships between universities and industry classifies the model as strong or weak depending on the levels of influence exercised by the government. Singapore, for example, was successful in adopting this model.

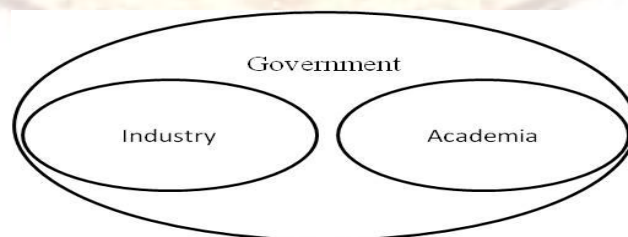


Figure 3.2: Statist Triple Helix model
Source: Adapted from (Etzkowitz, Webster, Gebhardt & Terra, 2000)

The second model, “laissez–faire” Triple Helix, depicted in Figure 3.3, consists of separate helices representing the three institutions, which act competitively rather than cooperatively in their relationships with one another. Etzkowitz (2002) argues that in the Laissez–Faire model, the university provides basic research and supplies knowledge mainly in the form of publications and workforce–ready graduates. In this model, the industry explores and exploits knowledge provided by the universities with minimal cooperation (Etzkowitz & Zhou, 2003), and is exemplified by the U.S (Etzkowitz, 2002).

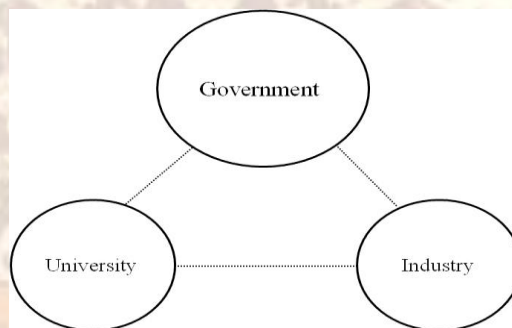


Figure 3.3: “laissez–fair” Triple Helix model
Source: Adapted from (Etzkowitz, Webster, Gebhardt & Terra, 2000)

Triple Helix III, the third model depicted in Figure 3.4, and is an interactive model where the three helices overlap, yet remain independent. Exploring the roles of the UIG within the model is crucial to gain a better understanding of the Triple Helix III model as an innovation model. South Korea has successfully implemented this model (Park & Leydesdorff, 2010).

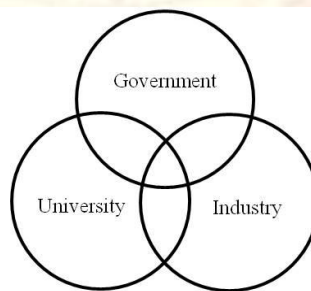


Figure 3.4: Tri–lateral and hyper organizations Triple Helix model
Source: Adapted from (Etzkowitz, Webster, Gebhardt & Terra, 2000)

The three Triple Helix framework models represent the levels of interaction and collaboration among the three actors in a UIG partnership, which can be competing relationships or strategic partnerships. The role of government is similar in all, however in the statist model, especially in the GCC region; government has more of a dominant role. These models have been successfully implemented in nations like Singapore, South Korea and the U.S., few questions remain to be explored: How did these nations transition from using one model to another? What were the challenges and lessons learned throughout their transition?

Actors in University Industry Government (UIG) Partnerships

Universities

Universities are becoming more engaged in supporting innovation as their role expands to include knowledge discovery and knowledge dissemination in society (Cooke & Leydesdorff, 2006). In a KBE, the university is a key institution for social and economic development, and focuses on knowledge creation and human capital development especially in developing nations such as those in the GCC region. Traditionally, the role of universities focused on providing education, with minimal emphasis placed on consulting services of academic staff to assist in problem solving, and research and development (Bozeman & Boardman, 2003). This phenomenon still exists, for the most part, in the GCC region and in its national universities. However, in a KBE, universities are increasingly focusing on building partnerships with industry, to produce and exchange knowledge that enhances the competitive advantage of the industry (Tether & Tajar, 2008). Furthermore, as organizations diversify their portfolio of products and services, rapid changes in technology are making it necessary for industry to approach and establish links with universities, to address these challenges (Kaymaz & Ertigit

2011).

As producers of knowledge, universities are critical contributors to the economy via their involvement in the innovation process. Knowledge flow drives innovation. However, knowledge exchange and its spillover within a national economy is a dynamic and complex process that involves many different actors. Universities tend to be followers rather than leaders of innovation; consequently, national universities in the GCC region need to be more proactive in their contribution to innovation and economic development, as their limited focus on basic research minimizes the impact of their role in knowledge creation and the innovation process. Innovation requires sufficient conditions such as policies that incentivize research and build human capital capacities at the organizational level, and research and development capacities and establishment of partnerships with industry at the national, regional, and global levels, for the university to transform into a research-intensive organization —entrepreneurial university (Ma, 2008).

Etzkowitz (1998) was first to coin the term ‘entrepreneurial university’ to describe the critical role of universities in economic development. An entrepreneurial university is an integrated organization with an entrepreneurial culture that focuses predominantly on the production of new knowledge through research activities with commercial potential, formal intellectual property frameworks, and the training of expert personnel to carry out this production into the future (Etzkowitz & Zhou, 2003). According to Ma, University of California at Berkeley and Massachusetts Institute of Technology (MIT) were pioneers in developing the concept of the entrepreneurial university by creating two multi-disciplinary research centers (laboratories), heavily funded by the government, to focus more on problem-oriented (applied) research than inquiry (basic) research.

Bramwell and Wolf (2005) assert that the role of the university in economic development had been associated with the commercialization of novel knowledge that is represented in knowledge–spin offs. However, they further argue that the expanded role of the university in setting linkages with industry has a wider impact on national economic development. They define a university spin–off as:

“A commercial entity that derives a significant portion of its commercial activities from the application or use of a technology and/or know-how developed by, or during a university-funded research program. The new enterprise is created (1) to license a university invention, (2) to fund research at the university in order to further develop a technology/invention that will be licensed by the company, or (3) to provide a service using university–derived expertise” (p. 14).

Effective knowledge exchange requires proper research capacity within industry firms to acquire and apply external knowledge. Absorptive capacity is built through recruitment of educated and trained researchers and scientists from universities. The implications of this dynamic knowledge exchange process would not only be limited to building the industry absorptive capacity, but also include building formal and informal social and professional networks, both locally and globally, to further contribute to the innovation process and KBE development (Bathelt, Malmberg & Maskell, 2004).

Industry

In the Triple Helix framework, industry is critical to the national innovation system, and the economic development of the nation. The effectiveness of the role of industry in the innovation process is impacted by its knowledge stock (Uysal, 2008). Industry knowledge stock or organizational knowledge - *the knowledge that remains within the organization when employees*

leave for the day, and research and development intensity are indicators of the establishment of external relationships, which facilitate the flow of innovative ideas and human capital development (Hatch & Dyer, 2004). Organizations simultaneously utilize multiple sources of knowledge and linkages to advance their innovative output (Bogers, 2011). These sources of knowledge vary from internal research and development, industry clusters and universities, and public research facilities.

Internal Research and Development

Internal research and development is a factor purported to make significant contributions to the innovation process in organizations (Schilling, 2010). The two types of research are basic and applied. Basic research in organizations, although a core role of universities, focuses on *maximizing understanding* and increasing scientific knowledge; this may not always translate to immediate commercialization as prior modifications and enhancements through applied research are necessary (Grossman, 2009).

The reciprocal relationship between industry and university is further enriched by (a) applied research (know-how) as a source of technology exchange, and (b) basic research as a source of knowledge transfer (know-what) functions (Grossman, 2009). The challenge in the GCC region is two-fold: The first is that industry organizations in the region lack in the area of applied research. They have neither the infrastructure nor the human capital to be productive, nor compete at the global level. The second is that universities have been slow in developing industry-relevant basic research. Similarly, they are not advancing in the applied research field. Industry, especially in the GCC region, can further increase its knowledge stock by forming industry clusters of competing and complementing organizations.

Industry clusters. Industry clusters refer to groupings of linked organizations located in

close geographical proximity, and they compete with and/or complement one another. Kim, Barkley, and Henry (2000) refer to horizontal clusters as including complementary organizations covering the entire value chain of the industry, and vertical clusters as including competing organizations that offer the same product line or the same services. Industry clusters offer many advantages including, according to Schilling, clusters that help build social capital among member organizations, facilitate efficient and effective knowledge and technology transfers, increase innovation productivity of member organizations, and stimulate economic development through entrepreneurial activities as the clusters grow in size (Schilling, 2010).

According to Shields, Barkley, and Eney, industry clusters offer organizations many advantages and challenges. There are three principle advantages to clustering. First, cost savings to cluster members due to the availability of human capital and support services within the cluster. Second, proximity among members of the cluster to enhance the exchange of tangible and intangible assets, and provide members of the cluster the necessary agility to market changes. Third, opportunities for the members to dedicate their resources to value-add innovative activities by being able to focus on core business activities (Shields, Barkley & Eney, 2004). Shields and others argue that the main challenge that industry clusters face is from a policy perspective in that government has a limited role in driving cluster formation, a challenge that exists in the GCC region as well.

According to Porter Porter (1998), clusters potentially increase productivity and therefore, governments must provide appropriate macro- and micro-economic policies that facilitate continual supply of necessary requisites such as infrastructure, intellectual property protection, and human capital. In developing economies, a bottom-up approach is more suitable to creating and supporting clusters. Therefore, the role of government is more crucial in

developing countries since governments need to be active in providing support to maintain these clusters rather than enforcing the creation of new ones.

Government

The role of government in UIG partnerships has been the focus of policymaking research in many transitioning economies (Mowery & Sampat, 2004). The different elements of these partnerships include linkages such as joint research and development endeavors, human capital development to include staff exchanges, continuing education, consultancy services, commercialization of research and development of innovative products, the creation of industry clusters for collaborative research and development at both the national and international levels, and funding (Martin, 2000). Policy-makers assess these partnerships as important proxies for economic and social development, productivity, and job creation (OECD, 1999).

Hernes and Martin (2001) concluded in their research on the management of university–industry linkages, which concurs with the Triple Helix framework as an intertwined social and professional network of the three actors in the UIG (Leydesdorff & Meyer, 2006), that the government’s role is a crucial and critical success factor in the development of effective UIG partnerships. Thompson (2007) presented a similar conclusion with a specific emphasis on developing countries. The role of government can be effective in developing national innovation systems because it helps develop the UIG partnerships, and facilitates and coordinates interactions between universities and industry, creating an environment conducive to innovation (Bontis, 2004). For instance, in the United States of America, the increased focus on university–industry relationship research lead to the passage of the 1980 Patent and Trademark Law Amendments Act known as the Bayh–Dole Act, which allowed universities to own the rights to their inventions developed with federal funds, consequently influencing the U.S.A.’s intellectual

property policy. Increased incentives to commercialize public research, resulting in the emergence of a novel profession; academic technology transfer (Sampat, 2009). This legislative and empowering law has been successful, and other nations have been influenced enough to adopt similar changes to their laws and policies. By setting proper criteria for identifying and selecting intellectual property, developing nations could greatly benefit from similar legislation to stimulate their innovation process. The challenge in most developing nations, specifically in the GCC region, is the absence of the private sector in UIG partnerships, where government influence is limited.

Due to lack of national human capital, GCC countries rely heavily on imported innovation and technology and as a result, they are disadvantaged when it comes to knowledge transfer. Multinational organizations are not motivated to create and share new knowledge with their host countries; rather, they rely on importing their technology from their home bases. Martin (2000) states that policies and procedures for effective intellectual property management to balance the challenges in knowledge exchange and intellectual property is a major success factor that facilitates the establishment of relationships between universities and industry, and the creation of intellectual capital, especially when multinational organizations are based in emerging economies.

University-Industry-Government Linkages

In a UIG partnership, there are three main linkages used for collaboration between organizations to create and share knowledge.

Education and Training Linkage

This bidirectional linkage represents the relationship between universities in the region and

industry, in terms of human capital development through formal academic and informal training. Knowledge flows in both directions in this linkage and is created by the university through the various education programs, and transferred to industry through students. Similarly, knowledge flows from industry to the university through formal and informal feedback, to enhance and adjust the education curriculum. This linkage is also essential in supporting the other two linkages: Professional services, and research and development.

Education and training is a linkage that offers formal academic education programs. Academic education has been evolving strategically, both in scope and in quality, over the past few years allowing universities to evolve from institutions that provide limited undergraduate degree studies to institutions that offer certified and accredited graduate programs. The official announcement of national vision initiatives in the GCC region has incited multiple organizations, directly and indirectly, to realign their vision and mission statements with the national vision of their respective country. In addition to re-emphasizing their visions of providing society with a skilled workforce capable of contributing to the national development of their respective countries, they have incorporated research and development into their vision. This adoption has resulted in the formulation of various strategic objectives that are aligned with their national visions. One strategic objective of universities, as highlighted in their research strategic plans, is to develop the required research capacity within faculty members and students, in order to support research and development initiatives at the university. This has motivated universities to develop their education and training linkage and offer more comprehensive graduate programs that include various Masters and PhD degrees in the majority of their academic programs.

Additionally, this linkage is fundamental to the development of industry experience especially through internship programs. During an internship program, many stakeholders are

involved, with students being the main concern in the program, where they work on capstone projects that address industry-specific processes and operational challenges. Faculty members, in addition to their academic roles, are also involved in the internship programs as technical consultants and mentors. They also facilitate collaborations between students and industry subject-matter experts in their respective organizations. Therefore, a well-developed education and training linkage can build the needed capacity that both organizations need.

Professional Services

This linkage establishes a partnership among institutions through professional services such as academic and professional consultations. In this partnership, organizations seek professional advice to resolve organizational problems that are beyond their existing capabilities and abilities. As previously discussed, education and training linkage has a direct impact on professional services linkage, especially through internship programs. This linkage provides opportunities to identify and jointly collaborate over potential organizational challenges. However, to leverage this linkage, organizations must have supporting policies in place to motivate faculty and industry subject matter experts to develop and sustain partnerships.

Research and Development

Research is basic scientific knowledge, however, remains important in building general human capital for the organization; consequently, establishing a knowledge exchange relationship with external sources such as other firms, specifically universities as the main providers of basic research, provides an efficient channel for sharing scientific knowledge to improve innovative capacity (Xu, 2010). External resources allow the organization to increase its knowledge base and enhance its ability to innovate through applied research, which often builds on knowledge created from basic research in an effort to solve organizational problems (Narteh, 2008).

Schilling defines applied research as “directed at increasing understanding of a topic to meet a specific need” (Schilling, 2010, p. 25). Applied research has been conventionally associated with industry as it contributes to economic growth through the commercialization of its innovative outcomes. In a KBE, applied research is no longer limited to industry; in fact, universities have extended their mission by assuming some industry functions such as applied research. Research and development in a KBE is vital to building national innovation systems. The GCC region is playing a major role in facilitating appropriate environments for building research capabilities by committing resources to research and development. Further, since research and development are highly dependent on higher education, leadership across the region has committed substantial resources to enhance the entire education ecosystem. In an effort to establish and enhance the research and development capacity, universities have integrated research and development into their strategic management plan where strategic objectives are aligned to national priorities. This commitment towards research and development is in line with the pivotal role universities play in achieving the objectives of their national vision.

Factors Affecting University Industry Relationships

The level of impact of the universities’ activities on industry, and the type of relationship between universities and industry depends on the knowledge intensity, the level of knowledge stock and flow, and the absorptive capacity of the industry, as well as the availability of suitable policies for knowledge exchange in universities, industry, and government (Gertner, Roberts & Charles, 2011). Policies to promote effective human resources management for human capital mobility, and information management systems to facilitate open and transparent access to information and knowledge (Bhatt, 2001) and protect innovative outcomes and intellectual property (Chen & Wang, 2010) will influence the production of knowledge and innovation. A

major prerequisite is the classification of, and access to information and knowledge repositories when they exist, which need to be made available to the right person at the right time. Organizational policies that introduce and encourage a culture of knowledge management will contribute to the innovation process and KBE transformation (Leidner, Alavi & Kayworth, 2006).

Sanchez suggests that knowledge exchange among organizations is predominantly limited to explicit forms of knowledge (Sanchez, 2002). In a UIG, it is the formal exchange of explicit knowledge through publications and patents, and formal consultation services in problem solving and collaborative research that has been more of a focal interest than tacit knowledge exchange (Schartinger, Rammer, Fischer & Frolich 2002). Etzkowitz, Dzisah and Zhou (2007) identified three requisites for successful and effective UIG partnerships:

1. The university's role must be at the same level as that of industry in the innovation process, which means that the university should operationalize its "third mission" by strengthening its role in the commercialization of research Carlsson & Fridh, 2002).
2. A collaborative and mutually beneficial relationship must exist between the different institutions where knowledge resources and facilities by the different institutions.
3. Role integration should happen among the three institutions where universities take on an entrepreneur role, government takes on a venture capitalist role to fund research projects, and industry firms elevate their training and development programs (Cosh & Hughes, 2010).

Key Performance Indicators for Linkages in UIG Partnerships

Key performance indicators (KPIs) are effective in monitoring organizational operational performance. Gardner, Fong and Huang (2010) assert that the effectiveness of knowledge transfer activity should be determined for the following reasons; to illustrate the advantage to society from advances in knowledge, to ensure sufficient returns on investment and provide benchmarks for comparison across the industry, to promote competition in the global marketplace, and to support future appeals for funding. Although evaluating the performance of UIG linkages is important, the involved organizations have yet to develop any structured systems of performance indicators aimed at measuring the effectiveness of these collaborations.

Currently, the various indicators for measuring university-industry linkages can be generalized into input, output, and outcome indicators. Input indicators, which include resources, and the researcher's and firm's capabilities and motivation (Seppo & Lilles, 2012), show only a commitment to linkage and not the outcome of such a linkage, albeit their expansive use. Given the importance of outcomes in UIG linkages, output indicators are also vital, if not more appropriate than input indicators in evaluating the efficiency of linkages (Pertuzé, Calder, Greitzer, & Lucas, 2010). Output indicators of a UIG linkage are grouped based on the type of collaboration (Table 3.1).

Table 3.1

Table 3.1: Output and outcome Indicators of a UIG Linkage

Type of cooperation	Output indicators	Outcome Indicators
Education and Training	<ul style="list-style-type: none"> • # of academic programs/curricula developed in cooperation with industry • # of courses with guest lecturers from industry • # of joint supervision of master and/or doctoral theses; • # of graduates • # of student trainees in industry • # of student placements in industry • # of PhD student exchanges (with industry) • # of industry-funded postgraduate positions/scholarships • # of entrepreneurship courses to students and researchers in university • # of attendees at entrepreneurship courses 	<ul style="list-style-type: none"> • Improvement in onboarding programs for new national graduates • Increase in participation of industry professionals in academic institutions • Increase in involvement of faculty members in industry lead initiatives • Increase in industry involvement in academic curricula development • Mobility of faculty across the region • Achieving critical mass in research teams • Organizational changes implemented to better adapt to collaborative research • Global Ranking • Reciprocal trust • Quality of Academic research as a result of direct and proactive collaboration with academia • Impact on quality of work of faculty and professionals • Quality of UIG collaborations • Capacity for innovation • Quality of scientific research institutions • Organization spending on R&D • Availability of scientists and engineers • Patents, applications per million population • Human Capital & Research • Economy diversification • Industry sophistication • Share of GCC Nationals in the Workforce • GCC nationalization in the Private Sector • Global Ranking.
Professional Services	<ul style="list-style-type: none"> • # of professional development courses held • # of researcher exchanges between university and industry • # of lecturers from industry in the university 	
Research and Development		
Academic mobility	<ul style="list-style-type: none"> • # of researcher exchanges between university and industry • # of postdoctoral or doctoral positions offered within alliance. 	
Commercialization of R&D results	<ul style="list-style-type: none"> • Market value of spin-offs; value of revenue generated by the spin-offs • # and value of contract research projects • # of joint publications • # of joint inventions 	

Source: Seppo and Lilles Error! Bookmark not defined.

Key Takeaways for Developing Nations

1. Develop institutional policies to support and incentivize partnerships (all actors) within each country, but more importantly across the region.
2. Proactively engage each other in universities and industry collaborations for increased benefit.
3. Engage universities in initiatives that industry organizations outsource to contractors and consultants, to build the knowledge base of universities in the region. The level of engagement can be adjusted based on participants from the university.
4. Proactively seek collaborations with industry by recruiting industry experienced professors and lecturers to universities, which can lead to increased trust from industry in the abilities of the faculty.
5. Encourage human capital mobility in UIG partnerships within the region. A structured rotation of faculty members and SMEs to institutions in the region will help bridge existing and potential gaps, share experiences across the region, focus the research agenda of the region, and most importantly, create a database registry of all competencies in the region.
6. Align undergraduate and graduate education curricula with the needs of industry to better respond to industry needs.
7. Establish and improve Intellectual Property practices and Technology Transfer functions to motivate researchers.
8. Establish a national/regional competency framework and repository of current and future skills in cooperation with all actors. This will have a positive impact on recruitment, onboarding, and retention of human resources and their capital.

9. Operationalize science parks and business incubators in the region to incentivize innovation across the GCC region.
10. Support the development and training of resources (from all actors) to handle the complex and multidisciplinary work associated with UIG partnerships. This includes creating an organizational structure capable of supporting and facilitating UIG collaborations such as Technology Transfer Offices (TTO) or Knowledge Transfer Offices (KTO), to facilitate knowledge creation, conversion, exchange, and diffusion. A national level TTO can also create positive momentum to help navigate conflicts. This function should also exist in the GCC region to provide the needed support across the region's collaborations.
11. Developing appropriate KPIs for UIG linkages is a key success factor in the alignment and sustainability of the partnership.

Conclusions

In order to expand and diversify the base of their economies and to attract foreign investments, GCC countries are increasing efforts to situate themselves at the heart of the technology, research, and information industries. Investment in the education and research infrastructure, coupled with technology inflows by top organizations is creating ideal conditions for building innovative capacities in the region. One of the key drivers for building innovative capacities is UIG partnerships and the three linkages on which these partnerships are based; education and training, professional services, and research and development that contribute to the development of competencies that lead to innovative capacity in organizations.

The education and training linkage in the partnership contributes the most by developing fundamental human capital competencies. The education and training linkage also supplies the other linkages, professional services, and research and development, with the needed skills through developing competencies that are required by industry such as problem-solving skills. The professional services linkage is in the early developmental phase and its contribution is very limited at this point due to industry's lack of confidence in university-industry-related experience. The research and development linkage are contributing to the innovation system more from a qualitative, as opposed to a quantitative perspective.

A regional GCC strategy to drive a change in organizational culture that values UIG partnerships is a must to refocus their efforts toward the transformation process. Strategically align organizations' role in UIG partnerships with their strategic objectives is key to their success. This will require a major change to the conventional role of participating organizations to be integrated in their business processes. Most importantly, trust and value recognition are paramount to the development of effective UIG partnerships in the region, where knowledge creation and utilization is secured through multinational corporations with minimal impact on GCC states as host nations. Finally, for any development programs to be successful, they must be monitored and measured for alignment and realignment with their strategic objectives. A performance Management system is needed to measure both output and outcome of UIG partnerships.

Although stakeholders are not expecting the GCC to lead in the number of inventions and patents, regionally or globally, they are expecting the culture to begin shifting towards research and development. Indeed, a culture change has begun as there is evidence of leadership support

and commitment, whether through policies and strategies or through financial commitment, to reform and further build the education systems in the region.

About the Author

Haytham Abduljawad, founder of Knowledge to Power Consultants and the author of “Knowledge to Power A Nation”, earned his PhD in Human Capital Management, with a concentration in Knowledge Management from Bellevue University. Throughout his nearly 30 years of experience in multinational organizations, he believes that the key to effective organizational and national transformation is through knowledge creation and diffusion.

During his professional career in the Gulf Cooperation Council (GCC), he studied the region’s efforts to shift from hydrocarbon based economies to knowledge based ones. His research has reaffirmed his belief in the importance of partnerships between university, industry, and government. His findings suggest that these partnerships are essential to the successful transformation the GCC countries are aspiring to achieve.

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