



Opportunities for Knowledge Sharing, Knowledge Transfer, and Innovation in the UAE through Academia-Industry Collaboration

فرص لمشاركة ونقل المعارف والابتكار في دولة الإمارات العربية المتحدة
عبر التعاون بين المجالين الأكاديمي والصناعي

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Abstract

Competition and technological changes continue to increase at a rapid rate which leads to a significant growth in the need for connection between firms and universities, not only to discover knowledge but also to achieve improvements in performance. Universities play an important role in the society as developers and creators of knowledge. Knowledge improvement can be achieved by stable research, innovation, successful knowledge transfer, and knowledge sharing.

There are some signs of interest from the industry to cooperate with universities recently in the UAE; however, the majority of the companies are implementing their projects without a relationship with academia. Lack of such relationships may lead to spending more time and money because of lost opportunities to use innovative methods in executing projects. Therefore, it is helpful to explore the status of industries and universities in terms of their awareness about the importance of such collaborations.

The overall intent of this research is to explore how academia-industry collaboration can be enhanced in the UAE and whether such collaboration can improve knowledge sharing, knowledge transfer, and innovation. A systematic literature review from published studies that focus on academic-industry collaborations was developed to identify the reasons, drivers, and barriers to such collaboration. A number of interviews were conducted based on the information attained from the literature. Interview respondents were chosen from academics and industry personnel in order to attain information from both academics and industry personnel point of view.

The results showed that low levels of collaboration between universities and firms take place in the country. Lack of trust, organizational culture, time, intellectual property and confidentiality are found to be important factors that prevent such relationships. On the other hand, financial aspects, knowledge sharing, knowledge transfer, and innovation are among the main elements identified in improving academic-industry collaborations. The research findings can help industry personnel and university faculty to reduce the potential barriers to their collaboration with each other and enhance their performance by encouraging stable and effective academic-industry collaboration.

فرص لمشاركة ونقل المعارف والابتكار في دولة الإمارات العربية المتحدة

عبر التعاون بين المجالين الأكاديمي والصناعي

تستمر التغييرات التي تطرأ على مجالات المنافسة والتكنولوجيا بالازدياد بشكل مطرد وتزداد معها الحاجة لإيجاد تواصل بين الشركات والجامعات ليس لاكتشاف المعارف فحسب وإنما لإنجاز التطور في الأداء أيضاً. هذا وتلعب الجامعات دوراً مهماً في المجتمع بصفتها الطرف المسؤول عن استخراج المعارف وصقلها، فتطوير المعارف يحتاج إلى بحث متوازن وإبداع ونقل صحيح للمعارف ومشاركتها.

لقد بدأت الصناعات مؤخراً في دولة الإمارات العربية المتحدة تميل إلى التعاون مع الجامعات إلا أن معظم الشركات تتجاهل علاقتها بالأخيرة عندما تنفذ مشاريعها. إلا أن تخليها عن هذه العلاقة قد يكلفها إنفاق المزيد من الوقت والمال كي تتمكن من تعويض الفرص الضائعة في استخدام السبل المبدعة في تنفيذ مشاريعها. لذا تكمن الفائدة في دراسة مقدار الوعي الذي تكنه الجامعات والصناعات لأهمية علاقات التعاون هذه بينها.

إن الهدف الأخير لهذا البحث هو اكتشاف السبل التي تؤدي لتطوير هذا التعاون بين الجامعات والصناعة في الإمارات العربية المتحدة وما إذا كان من الممكن أن يطور هذا التعاون كلاً من الإبداع ومشاركة المعارف ونقلها. لقد تم إعداد استطلاع منهجي مطبوع من أبحاث منشورة تدرس بعُمق زوايا التعاون الأكاديمي الصناعي وذلك لتحديد أسباب ومحركات هكذا تعاون والعوائق التي تقف في وجهه. وتم إعداد عدد من المقابلات بناءً على المعلومات التي سجلتها تلك الأبحاث. وتم اختيار ضيوف المقابلات من موظفين يعملون في المجالات الأكاديمية والصناعية على حد سواء وذلك بغية الحصول على معلومات من وجهة نظر الموظفين في كلا المجالين الأكاديمي والصناعي.

أظهرت النتائج مستويات منخفضة من التعاون بين الجامعات والشركات في دولة الإمارات العربية المتحدة. فضعف الثقة والثقافة التنظيمية والوقت والملكيات العلمية والخصوصية هي عوائق مهمة تقف في وجه تحقيق هذه العلاقات. ومن جهة أخرى فإن النواحي المالية والإبداع ومشاركة المعارف ونقلها هي الركائز الأساسية التي تتبنى تطوير التعاون الأكاديمي الصناعي. من الممكن أن تساعد نتائج الأبحاث الموظفين في مجال الصناعة وموظفو الجامعات على التقليل من العوائق التي قد تقف في وجه التعاون بين الطرفين وتطوير أدائهما من خلال تشجيع التعاون الأكاديمي الصناعي الفعال والمستقر.

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1. Introduction

1.1 Background

The relationship between academia and industry was initiated a long time ago. Such a relationship started at the beginning of the 19th century. The Morrill Act in 1862 affected the cooperation between universities, government, and industry. The legislation was introduced to accomplish the need for higher academic institutions and universities to play more effectively in the economic growth of United States. Later, the Hatch Act of 1887 enhanced the relationship between universities and industry. By this Act, federal funds were granted to agricultural experiment stations and to universities for their researches. In addition to the Hatch Act, the Smith Lever Act of 1914 granted federal assistances for applied researches adding to the services given to the agriculture economy (Allan 2001). In addition to US, other countries such as the United Kingdom, France, and Germany also experienced university-industry collaboration since a long time ago. Such collaborations which were usually based on research and development started to improve in Europe from the beginning of the 19th century (Viale and Etzkowitz 2010).

Universities play an important role in the society as developers and creators of knowledge. Innovation, scientific advances, and improvements are generated through two general processes that are exchange and combination. When resources are held by different groups, such as universities and industry, exchange of knowledge is essential for each group (Freitas et al. 2012). The shared knowledge and information allow industries and academics to build on each other's work and to gain desired results and outcome much faster. Therefore, scientific improvement and its societal benefits are linked to information exchange between academia and industry. Competition and technological changes are increasing considerably which leads to a significant growth in the need for connection between firms and universities not only to discover knowledge, but also to achieve improvements in performances (Eom & Lee 2010; Haeussler 2011). Knowledge improvement can be achieved by stable research and development of investments, skilled workforce, commercializing innovative

knowledge and successful technology transfer. University and academic institutes are important sectors in generating and maintaining knowledge-intensive organizations in the industry (Geiger & Creso 2005).

Universities tend to cooperate with other organizations in order to get familiar with real life issues and create innovative ideas so that they can build up new functions and resources like incubator facilities in the university campus (Baba 1988). From the industry point of view, the relationship with the academic institutions is attainment of new knowledge. This implies that such relationship will result in knowledge improvement and skills of industry's personnel and higher profits of the industry (Poyago-Theotoky et al. 2002). Research sponsorship, cooperative research, technology, and knowledge sharing are some important drivers of the cooperation between universities and industry. In addition to the need for innovation and knowledge transfer, governments' interest in hiring educated local workforce is considered as a motivation for university-industry relationships; however, industry and academia face some issues and barriers towards such relationships. Conflicts of interests, intellectual property, and confidentiality are some concerns regarding university and industry partnership (Forstenlechner 2010; Campbell 1997).

1.2 Research Problem

The United Arab Emirates has experienced several projects in different fields such as construction, manufacturing, and technology since several years ago. Although there are some signs of interest from the industry to cooperate with universities recently, but the majority of the companies are implementing their projects without a noticeable collaboration with the academia. Universities can act as knowledge creators and developers in the society. Updated knowledge and innovation are important factors for the industry; consequently, the role of academia as a source of new knowledge has become more important in compare to the past because of continues increase in the competition and technological changes. Thus, this research will attempt to evaluate the status of academia-industry collaboration in the UAE and investigate the methods of enhancing such collaboration in the country.

There is a need for both academia and industry to collaborate with each other. This is because such collaboration would enhance their skills and performance through exchange of knowledge, innovation, and providing practical solutions to real life issues. There is evidence that low levels of collaborations between industry and academia take place in the UAE. Therefore, it is helpful to explore status of industries and universities in terms of their awareness level about the importance of such collaborations. Lack of such relationships may lead to spending more time or money because of lost opportunities to use innovative methods in executing projects.

1.3 Research Aim, Objectives, and Questions

Research Aim

The aim of this dissertation is to undertake an exploratory study to determine the level of academic-industry collaboration in the UAE and to explore the awareness and realization of organizations' decision makers about the value of such collaboration. The drivers, enablers, and barriers impeding academic-industry relationship would be defined. In addition, investigating how such collaboration can be developed and remain current and useful to all stakeholders are among the aims of this research.

Research Objectives

The following are the objectives of this dissertation that are developed to achieve the research aim:

- To provide an extensive literature on the academia-industry relationship
- To evaluate the status of the collaboration between industry and academia in the UAE
- To explore the potential drivers and barriers to create an environment in which academia and industry can collaborate effectively

- To identify needs and expectations of different stakeholders in the UAE from such collaboration
- To explore the advantages of this relationship for academia and industry in the UAE

Research Questions

The research objectives are used to developed research questions that this research will propose to answer:

- What is the status of academic-industry collaboration in the UAE, and how organizations' decision makers are aware of the importance of such collaboration?
- What are the main factors that enable or impede interaction between academia and industry?
- What are the expectations of different stakeholders in the UAE from such collaboration?
- How can such interaction bring benefit to both academia and industry?

1.4 Dissertation Structure

During the dissertation process, extensive literature review was covered in order to understand the fundamental concepts of academic-industry relationship and its effect on organizations, as well as motivators and barriers of such relationship. The knowledge created will then be applied in preparing interview questions to evaluate the academic-industry interaction practice.

Hence, the attained information will be evaluated and analysed to understand the status of such collaboration in the UAE, factors that affect such collaboration as well as advantages that it brings to both academia and industry. The proposed framework will mainly be limited to current UAE context taking into account the local organizations' culture and expectations.

In this dissertation, four objectives were mentioned in order to smooth the path for achieving the aim of the dissertation. The research concentrated on four major aspects: potential barriers and drivers to create an environment in which academia and industry can collaborate effectively, methods of connecting industry and academia in the UAE, expectations of different stakeholders in the UAE from such collaboration, and advantages of this relationship for academia and industry in the country.

The dissertation consists of four chapters, which assist in addressing the defined objectives of the research. The introductory chapter defines the scope of the research which presents a proper background about the interaction between universities and industry and its importance for each party. Four main objectives were introduced, and they were used to develop research questions that this research propose to answer. In the second chapter, a comprehensive literature is provided. In the first part of the literature, the history of academic-industry relationships, and how such relationship enhanced during several years is discussed. In the next sections, the reasons and motivation factors of such partnerships are explained in addition to potential barriers. In the last section, the methods of collaborations are described.

Methodology chapter explains the method used to achieve the objectives of the research. A qualitative research method was used to obtain the desired outcome. In this research, interview approach is followed in order to list questions in a way to make sure that interviewees would cover all related topics. Interviews are more appropriate to get answers for questions that need inquiry to attain proper information (Walliman 2011, p.80). Analysis of collected data is done in the next chapter. Collected data was compared to the literature. This enabled the researcher to compare the current practice of academic-industry collaboration in the UAE with the same in other countries such as Europe and the United States. The enablers and barriers of such collaboration in the country were explored. The results of the analysis were used to achieve conclusions and provide a set of recommendations. Conclusions and a set of recommendations are presented in the last chapter.

2. Literature Review

2.1 The history of Academic-Industry Cooperation

Considerable amounts of articles have been published about academic-industry relationships (Louis 2001; Bercovitz et al. 2001; Duderstadt 2005; Newfield 2004). These articles show that cooperation between academia and industry originated a long time ago. Such cooperation started at the beginning of the 19th century (Hutt 1983). Different legislations were introduced that enhanced the cooperation. For instance, the Morrill Act in 1862 significantly helped and improved the interaction between universities, government, and industry. Legislation was introduced to accomplish the need for higher academic institutions and universities to play more effective role in the economic growth of United States (Muir 1990). The Morrill Act enhanced farming performance, and had a significant role in converting the U.S. from an agricultural to industrial economy (Williams 1990).

The Hatch Act of 1887 enhanced relationships between universities and industry as well. By this Act, federal funds were granted to agricultural experiment stations and to universities for research. The Hatch Act initiated the technology transfer from universities. Each State in the U.S. was funded \$15,000 for their experimental stations that would improve the technology transfer process (Williams 1990). In addition to the Hatch Act, the Smith Lever Act of 1914 granted federal assists for applied researches adding up to the services given to agriculture economy (Williams 1990).

The relationship of industry organizations with university faculty and students increased in order to make it easier for industrial laboratories to be connected to academic research. Industrial personnel attended conferences in universities and met university faculty to attain the up to date knowledge and use it for their organizations. In addition, some companies hired some university faculty as consultants to find some solutions for specific industrial issues, or as long-term advisors for their research sections (Geiger 1989). The faculty's laboratory became a perfect place for

employment of staff for industry, and faculty and students learned to improve their research programs by cooperating with industrial people (Muir 1990).

In the 19th century, the government of the United States of America implemented the research methods adopted in Germany universities and offered federal funds to their universities for research and experiments (Eldon 1993). The important role of universities of higher education could be recognized in addressing significant national issues. Many universities started to do research in order to ascertain problems and provide practical solutions (Mc Dowell 2003). In the United States and some European countries, from 1920 to 1940, industrial and private sectors were considered as the major supporters for university research. Many research studies were done by cooperation of universities and industry, which helped in preparing an industrial based community. Meanwhile, some issues and tensions rose within universities' environments because of academic-industry collaborations. Such collaborations were being criticized because concentration had been diverted from basic research and courses towards applied research in order to attain financial profits. Many conflicts and arguments occurred about the universities doing research for industry against their basic researches (Muir 1990).

Cooperation between academia and industry increased considerably through the 20th century. In 1920, the contribution to academic research from industry organizations grew. Later, the U.S. and European countries' governments started to offer huge amounts of funds to research in universities who followed national as well as academic interests (Smith 1990). In their paper, Campbell and Slaughter (1999) explained that after World War II, providing funds for academic research became a centre of prestige as federal government started granting research funding to universities for their basic research. With increase in such funding, universities were encouraged to look for federal funding. Within this period, cooperation between universities, government, and industry developed. The U.S. government started to arrange groups of research from industry and academia for their federal research that led to important military inventions (Smith 1990).

Muir (1990) explained that although the government funding for academic research increased after during World War II, industry lowered its investment for such

researches. From 1950 up to the end of 1970, universities showed less interest regarding industrial financial support as federal government of the U.S. continued to provide funding which led to the growth of higher education. The late 1960s witnessed aggressive student protests against classified federal research and participation of industry at universities in the United States. These protests compelled government and industry to count on their internal research ability. As a result, universities experienced financial reduction and stopped their connection with research institutes. Moreover, some universities initiated campaigns over government meddling and regulations, and aligned themselves with industries that had experienced same issues with the government (Campbell & Slaughter 1999).

During 1970 to 1980, national research programs facilitated connection between academia and industry in western countries. Improvement of collaborations between academia and industry happened because universities recognized that industry paid more attention into applied research and funding expansion. Consultation by university faculty for industry solutions increased during this period. Some well-known universities such as Harvard and MIT tried to continue and enhance their collaborations with industrial firms (Muir 1990).

At the end of 1970s, relationships between university and industry promoted significantly. One of the important examples of such partnerships is Harvard University-Monsanto Corporation research partnership which included creative property rights for the company supporting research at the university (Hong & Yunzhong 2001). In 1980, industry was encouraged to cooperate with universities and such relationship went further than financial support. Both industry and academia started to collaborate more in order to achieve their mutual benefits. This kind of relationship can be referred to as a new start for academic-industry collaboration (Mowery & Sampat 2005). Hong and Yunzhong (2001) pointed out that some public policies issued in order to increase academic-industry cooperation. Changes in public policy could be mentioned as an assistant to advance collaboration between universities and industry. Such policy changes were applied because of the needs for new technologies and to win in the international competitive market. Many new fields were introduced such as biotechnology and information technology. Such fields needed a combination of resources that were available in both universities and industry

(Povoa 2010). Cooperation could improve the knowledge transfer which would result in a product with a realistic application and commercial importance which would benefit the society.

In the United States, new federal legislation issued by Bayh-Dole Act (Patent and Trademark Law Amendments Act) which allowed academia and universities to follow up businesses and make profits from their patents. This legislation allowed academia to patent financially supported researches on a large scale and to bring in the university research much faster in the market. Industry also got benefit from such legislation because they could get information and knowledge from the research done by academics and by licensing university inventions (Washburn 2005, p. 8).

Stevenson-Wydler Technology Innovation Act of 1980 was another rule that increased the motivation for academic-industry relationship. This act, which can be deemed as a technology innovation, offered legislative permissions for cooperation of universities and government agencies. In addition, this act authorized Secretary of Commerce in the United States to set up some centres for industrial technology. These centres formed relations with universities, encouraged technological innovations, and assisted them in technology transfer to the industry (Dorf & Worthington 1990).

In addition to the U.S, other western countries such as United Kingdom, France, and Germany have also established university-industry collaboration for a long time. Viale and Etzkowitz (2010) noted that such collaboration improved in Europe from the beginning of the 19th century. Collaborations were usually based on research and development (R&D). Similar to the US, in the 19th century, industrial companies were counted as the key supporters for university research. Many research projects were done by partnerships of universities and industry.

It is obtained that such collaborations initiated a long time ago and nowadays exist in different countries. However, the level of interactions between universities and industry differs from one country to another. It is important to identify the reasons that companies and universities tend to interact closely. This is covered in the following section.

2.2 Reasons for Academic-Industry Relationships

Academic-industry relationship is a practice where members of the academic and industrial organizations collaborate and help each other for economic improvements which leads to higher career and job opportunities within the industry (Toshihiro 2008). The global competition is increasing relatively, and this leads to an increase in academic-industry cooperation.

Universities need to be supported by other organizations in order to attain regional development, and academic-industry partnership is a vital aspect for industry's competitive benefit. Several studies have attempted to explain the importance of university presence in a region for industry organizations. Premus (1982) pointed out that about sixty percent of the U.S. industrial organizations take the universities' existence as a significant aspect for organization's location. Barribal and While (1993) remarks that university presence is the fifth most vital aspect in making decision regarding the location of the company out of the top 20 important aspects. In addition, in their research, Dorf and Worthington (1990) obtained that about fifty percent of the industry sectors believed that being in close proximity to universities is helpful for their development.

University-industry cooperation will cause changes in goals and traditional viewpoints of industry organization. Consequently, the communication between industry and science encourages changes in research institutes. Licensing of technologies introduced by universities affects local economic development. Royalties offered because of licensed technologies would lead to an increase in university's profit (Kaufmann & Todtling 2001). However, not all reports consider that academic institutions and universities are vital means for local economic growth. There are many studies done by universities that do not have commercial viability, but they are valuable for industrial research and development endeavors (Geiger & Creso 2005).

Academic institutions and industry organizations need to cooperate with each other in order to assist regional economic growth. In the 1990s, California experienced critical situation because Federal funds related to defence and aerospace research reduced significantly, which resulted in loss of work positions. One of the important reasons that the state could emerge from such crisis was the cooperative research between

academic institutions and industries. The achievement of biotech industry organizations in California was because of research programs that started from academic institutions as well (Dorf and Worthington 1990).

By tradition, educational skills were linked to productive organizations by personal meetings. In the past knowledge transfer from academia to industry was usually by publications, conferences and consultations. Nowadays, academic research is mostly close to basic knowledge in the science, while industrial research goes towards instant market application. Publicly supported academic researches tend to improve the industrial research and development (Poyago-Theotoky et al. 2002). In addition, official technology and knowledge transfer actions like consultancy, research laboratories, training institutes, and technology committees started as well (Brimble & Doner 2007).

Baba (1988) mentioned that universities tend to cooperate with other organizations in order to obtain innovative ideas so that they can build up new functions and resources like incubator facilities in the university campus. Such cooperation with the purpose of innovative actions brings in profits to the university through attained funds by instructors and professors' entrepreneurship.

From the industrial point of view, relationship with the academic institutions is attainment of new information and knowledge. This implies that such relationship will result in knowledge improvement of industry's personnel and higher profits and skills of the industry (Poyago-Theotoky et al. 2002). Etzkowitz (2003) explained how cooperation between academia and industry would lead to innovation. They mentioned that usually the product is produced in an academic institute and the industry carries out the development process of the product. On the other hand, whenever a product is made outside the academic institutes, the universities would try to improve the product through their academic research. This shows that in both situations the academia is a foundation of knowledge and innovation for the industrial sectors.

Peters and Fusfeld (1982) expounded four major reasons that academia tend to cooperate with the industry: first, industry can be referred to as a source of profits and income for the academic institutions. Second, industrial funding given to universities includes less bureaucracy compared to funding from government. Third, research

projects given by industry to university would make familiarize students with the real world projects. And the fourth, some specific research funds offered by government are obtainable only by university-industry cooperation. Other aspects like lack of support from government and incentive of making revenue can be added to the reasons that universities tend to cooperate with the industry (Baba 1988). Beath et al. (2003) examined the possibility for universities to earn income by allowing their faculty and students to work on applied research projects. They explained that by letting university faculty earn extra income in this way, universities can lower the faculty salaries or use the budget for improving laboratories, classes and libraries of the university.

Academia and industry exchange information and knowledge through partnership. The knowledge exchange through this partnership occurs in different ways such as funded researches, knowledge transfer and collection of patents. Knowledge improvement can be achieved by stable research and development of investments, skilled workforce, commercializing innovative knowledge and successful transfer technology. University and academic institutes are important sectors in generating and maintaining knowledge-intensive organizations within the industry. The involvement of academia is mostly through skilled and trained human capital compared to economically valuable research (Geiger & Creso 2005). The advantages of such relationship for the industry are knowledge and expertise transfer from academic institutions and improvement of industry professionals' skills (Simmie 2003).

Lee (1996) investigated about the purpose of Academic-Industry relationship. He collected data from 400 joint-research ventures and concluded the following listed reasons by the industry people for such relationship:

- being able to access new researches
- achieving new patents
- developing new technology/products
- continuing relation with the university
- solving technical issues

On the other hand, academia listed the following reasons as incentives for such collaboration:

- to be able to test their research hypotheses
- having an exclusive research programme
- capability of buying advanced technology and equipment for their laboratories
- to gain practical and realistic knowledge in order to use in their laboratories and classrooms

In addition, Grant (2010) demonstrated that universities find it advantageous to cooperate with industry in order to attract development costs. Technological, financial, and strategic features are the three aspects that have been recognized in the literature as motivators for academic-industry partnership. Technological aspect is the most mentioned aspect in the literature. This aspect can be referred to as enhancement of research and development, and increase in patent activities. The financial aspect can be referred to as attaining new funding resources and enhancement in sales. And the last aspect, strategic aspect, can be explained as improvement in analysing and solving problems and scientific improvement of students (Link & Scot 2005).

In addition to the reasons for academic-industry interaction, it is important to identify the main motivation factors that lead to enhancement of such collaboration. The next section covers the drivers of the relationships between academia and industry.

2.3 Drivers of Academic-Industry Relationship

Universities and industry enhance their knowledge using different methods. In 2001, Santoro and Chakrabarti asserts that research sponsorship, cooperative research, technology and knowledge transfer as most important drivers of the cooperation between universities and industry. Wright (1990) mentioned some aspects that motivate both academia and industry to have closer cooperation with each other. The rapid improvement of technological knowledge, increasing the complexity of production progression and the need for innovation in the competitive market are some of motivation aspects. In addition, the new educational standards, and the willingness of keeping the universities updated according to social and market improvements as well as the incentive of internationalization are some other reasons that both academy and industry aim to have tighter relationship (Wright 1990).

In addition to the need for innovation and knowledge transfer, Forstenlechner (2010) considered the governments' interest in hiring educated local workforce as a motivation for university-industry relationships. GCC countries' governments have demonstrated a positive bias regarding using local graduated students as workforce. This is not only to encourage employing citizens instead of foreign workers, but also to invest in the local students in order to utilize their skills and research experience (Forstenlechner 2010).

Innovation, knowledge sharing, and knowledge transfer are the factors that most of scholars have mentioned as key motivators of academic-industry collaboration. Moreover, because of special conditions of workforce in the UAE, in which the government has planned a program in order to enhance the participation of local students as skilled workforce in regional companies, Emiratisation could be a driver of university-industry partnership in the country. Therefore, the following sections will focus on these three drivers: innovation, knowledge transfer/sharing and Emiratisation.

2.3.1 Innovation

According to Feldman and Florida (1994), a system is made of connections among different organizations such as universities, government and private companies, and innovation is considered as the heart of such connections. The collaborations among organizations result in creation of a new knowledge and the created knowledge would lead to improvement in regional technological qualification and economic development (Varga 2000). According to Romer (1990), innovation is one of the vital mechanisms of academic-industry relationships. It is because innovative ideas play an important role in local economic development. Local innovation abilities positively affect productivity and therefore growth in the region.

Feldman and Florida (1994) explained that innovation is the result of “individual capitalists firms, entrepreneurs and organization which function to organize and harness the various inputs required for innovation, profit and growth”. Innovation can be small changes that lead to formation of a new product, technology or process. The region's capability in applying knowledge for economic profits is significant for its economic growth. Innovation occurs whenever economically imperative knowledge is

facilitated in new methods (Maleeki & Bradbury 1992). Mansfield (1991) expressed that grown economies have shifted from manufacturing towards knowledge-oriented industries and local economies are developing in accordance to innovation for economic development.

The public considers universities as sources of innovative ideas and knowledge that provide solutions for industrialized society issues (Branscomb & Kodama 1999). Universities and academic institutes play an important role in regional development. This is because they improve knowledge by training and educating new workforce, and by using the results of their scientific researches and switching them into patents, products and services that enhance the academic-industry relationships (Power & Malmberg 2008). In addition, Ponds et al. (2010) emphasized that studies on academic-industry interaction demonstrate such connections are not restricted to the regional level; rather, they happen usually on the national or sometimes international level.

According to Hellman (2005), universities are considered as hearts of knowledge because of their ability in knowledge creation; therefore, they can spread and exchange innovative ideas with the industry. Research studies done in universities provide the path for knowledge transfer and industrial innovation. To determine the effects of universities on the industrial innovations, Palminteri (2005) investigated the role of some universities in the United States in developing innovative ideas. In 2003, Stanford University presented about 300 patents. In addition, Massachusetts Institute of Technology (MIT) generates approximately 150 new businesses, about 100 licenses and 20 technology firms every year through their faculty, researchers, current and graduated students. Such achievements in patenting could be seen from universities located in UK and European countries as well. Several well-known organizations such as Yahoo, Google and Netscape were outcome of innovative interactions between universities and industry (Palminteri 2005).

Innovative scientific ideas are introduced in university and academic institutions by doing basic research and are enhanced by applied research. By interacting with industry, university faculty and students get familiar with the real-world issues. By

doing researches on such issues, universities would be able to come up with their innovative ideas and solutions in solving the issues (Bercovitz & Feldman 2007).

Jensen and Thursby (2004) explained that other positive effects of academic-industry research-based partnerships are the value of research results and sharing patentable knowledge that can be used both in industry and academic institutions. Hellman (2005) remarked that by university-industry collaboration, university faculty would realize what is needed in the industrial organizations and this would help them to conduct their researches more effectively in a way that would lead to generating of innovative ideas. In addition, students and researchers would be aware of the real life application of scientific discoveries.

According to (Bercovitz & Feldman 2007) the overall innovation process includes a group of actions from basic research to marketing and commercial application. In order to have a productive innovation process, the creation of new knowledge and the transferring of the new knowledge into commercial products should be connected. Such connection depends on tight relations between those that do basic research and those where outcomes of such research are bases of their product commercialization. As main basic research is performed in universities and technological growth is a key factor for industry, well-built interactions between university and industry can improve the basic research-innovation connection.

Over the last decades, technological innovation has taken the manufacturing's place as the major driver of the world economy. The collaboration between academia and industry can be classified as research-based relationships in which industry provides funds to universities and attains options for innovative technologies in return. A winning relationship leads to licensed discoveries, and such discoveries are developed by the industry (Campbell et al. 2004). Conversely, Blaug et al. (2004) explained that technology-based industries have developed and become more complicated; as a result, the cooperation between academic institutions and industry has become more complex respectively. Some problems took place regarding intellectual property, academic freedom and disclosing research outcomes which lead to reconsidering academic-industry collaborations regarding their value to education and economy.

Most of the concerns were about how such relationships could be planned in a strategic way in order to enhance innovation and technological improvements.

Doring and Schnellenbach (2006) also supported that the existence of universities and research organizations has a vital effect on regional innovation because of regional knowledge spillovers that occurs from their researches. Hence, a lot of countries tried to legislate local innovation policies according to the existence of universities and academic research institutes in a region. Universities are considered as significant sources of regional knowledge and innovation because of their exclusive focus on the creation and distribution of knowledge. However, the value of academic research for innovation varies across industries (Cohen et al. 2002). The outcome of academic research is much more important for the science-based industries such as biotechnology industries. Scientific knowledge is significant for innovative activities of science-based industries. Therefore, sectors in such industries allocate a large investment on research and development (R&D) and interact significantly with universities (Doring & Schnellenbach 2006). Stuart (2000) declared that relationship between academia and industry is critical for innovation, especially in science-based industries. While partnership can be assumed as co-production of knowledge where inputs are converted to outputs, innovation happens as the result of such partnership. The knowledge exchange that occurs as a result of university-industry collaboration leads to knowledge creation and therefore innovation. Such collaboration is considered as a pathway for academic knowledge to get connected to the industry.

2.3.2 Knowledge Transfer/Knowledge Sharing

Many scholars have explained the concept of knowledge transfer. It is more than making knowledge available, and the knowledge that is just transmitted cannot be considered as transferred knowledge. There are two procedures that are involved in knowledge transfer: transmission procedure and absorption procedure. The transmission procedure occurs whenever knowledge is transmitted by the knowledge sender. And the absorption procedure happens when the knowledge is received by the receiver. Therefore, knowledge transfer occurs whenever both procedures are fulfilled

which means the knowledge is transferred by the sender and the receiver absorbs the transferred knowledge (Davenport & Prusak 2000).

Knowledge sharing is a process that needs dynamic communication (Shariq 1999). The effectiveness and success of knowledge sharing highly relies on the organizations characteristics. Mutual understanding, communication, support and trust can be classified as vital values for successful and effective knowledge sharing (Roberts 2000). According to Gupta and Govindarajan (2000), knowledge transfer and knowledge sharing depend on different aspects. These aspects are: the value of the organizations that share their knowledge, motivational nature of the organizations that share the knowledge, existence of facilities for interaction and cooperation of each organization, and the capability of the organizations to absorb and utilize the transferred knowledge.

An important indicator in academic technology transfer is the Bayh-Dole Act introduced in 1980, which gives the universities the right to patent discoveries reached from federal agreements and contracts. This act was introduced in order to make a path for the ideas and results of basic research to enter the market. Therefore, universities were able to facilitate licensing and patenting (Matkin 1990, p12). The early movement towards university technology transfer and knowledge sharing was offered by external affects such as national imperatives. Though, in 1990s, technology transfer and knowledge sharing happened more often because of institutional concerns and priorities rather than external affects (Povoa 2010). According to Dosi (1982), knowledge sharing and technology transfer between universities and business firms is defined as any actions intended to share and transfer knowledge and technology that may assist both the business firm and universities.

Matkin (1990, p.5), explained technology transfer as “the transfer of the results of basic and applied research to the design, development, production and commercialization of new or improved products, services or processes”. It can be obtained that technology transfer is a special type of knowledge transfer as in many situations what is transmitted is a knowledge that may lead to a technology and not the technology itself. Therefore, technology transfer needs continuous knowledge exchange and is usually not a one phase procedure. Technology transferred is an

extensive set of activities that reinforces the interaction between university and industry which opens the gate for academic research to enter the market (Povoa 2010).

In (2001), Schartinger et al. investigated about motivations and expected benefits from research partnership of universities and industry. They collected data from 309 Austrian university departments and examined the motivation factor of different types of relationship between universities and industry such as joint and contract researches. The collected data was analyzed and the results showed that department size, characteristics of the research, qualification of the researchers and type of scientific field are among important motivation factors for knowledge sharing and technology transfer between academia and industry. Hellman (2005) pointed out some factors that motivate academic researches to get involved in the industrial commercialization actions. In addition to the financial purpose, enhancing their reputation by attaining knowledge from industry and conducting successful research results that can be used by industry are some important factors of such partnership.

On the other hand, Carlsson and Fridh (2002) concentrated on another form of knowledge sharing and knowledge transfer which occurs through licensing and patenting. They collected data from several universities and research institutes in the United States. Their research result identified that institution size and research expenses are considerably related to the total number of patents. Moreover, it was obtained that university faculty tend to patent because of the positive personal and professional results of intellectual property protection.

Arvanitis et al. 2008 pointed out some important motivation factors for knowledge transfer/sharing among universities and industry: access to extra resources such as industrial knowledge, seeking higher research efficiency, willingness to access to new and specialized technology and gaining university funds.

In 1998, Haksson explained that technology transfer office has a significant role in helping the commercialization of research. A successful technology transfer depends on the investments of universities in technology transfer activities and quality of their technology transfer offices. Technology transfer offices that cover traditional objectives as well as commercial objectives of universities attain more licenses and

patents in contrast to those offices with simply an institutional orientation. The organizational structure of universities can affect the knowledge and technology transfer performance which direct the universities to different results in patenting or licensing, and technology transfer offices can have positive effect on such performances (Bercovitz et al. 2001). Moreover, Jensen and Thursby (2004) explains that other positive effects of academic-industry research based partnerships are the value of research results and sharing patentable knowledge that can be used both in industry and academic institutions.

In 2001, Cross et al. pointed out some important characteristics that a relationship should have in order to achieve an effective knowledge transfer and knowledge sharing: knowing the objectives of each organization from such relationship, having a situation in which both organizations can interact with each other easily, engagement of the faculty and industry personnel that are willing to participate in such cooperation and having a safe relationship to enhance learning and productivity. Szulanski (1995) confirmed that positive interaction between organizations involved in such collaboration is essential to achieve an effective knowledge transfer and knowledge sharing.

Davenport and Prusak (2000) also refer to the important factors that positively affect knowledge transfer within organizations. Trust, relationship and culture are some important factors that are essential for such cooperation. In addition to these factors, understanding the importance of knowledge sharing process and the fluidity of such a process are classified as essential elements of an effective collaboration (Davenport & Prusak 2000; Hansen 1999). Though, it can be obtained that the relation between business sectors and academic institutions such as universities should be enhanced by strengthening knowledge sharing and technology transfer actions (Arvanitis et al. 2008).

2.3.3 Localization/Emiratization

Using locals as workforce has been under study in different countries. For instance, in 2007, Rees et al. explained that most African governments implemented Africanization policies. Although each African country implemented and developed the policies in its own way, there was a common point through most of the policies and that was the

focus on public service and governments' enterprise. Many reasons have been recognized for implementation of Africanization policies. Some of the main reasons are: a) the willingness to consolidate political independence, b) the more economical situation in having native workforce instead of foreign workforce, c) the keenness to have the ability of managing own affairs (Rees et al. 2007).

Gulf Cooperation Council (GCC) countries face special conditions in having foreign workforce. These countries are highly dependent on expatriate employees (Forstenlechner 2010). Some of these countries such as Saudi Arabia, Qatar, Bahrain, Oman, Kuwait and the United Arab Emirates have planned and implemented a program in order to enhance the participation of citizens. The governments of GCC countries tend to show a positive bias towards organizations that use more locals as workforce compared to organizations that mainly recruit from overseas. This is not only to encourage employing citizens instead of foreign workers, but to invest in the locals in order to assist them to improve their skills and experience (Forstenlechner 2010).

Political leaders in the Middle East have recognized that dependence on foreign employees may have vital economic, social and political consequences. Therefore, different nationalization programs have been planned in order to encourage and enhance the employment of citizens in preference to expatriates. For instance, in Saudi Arabia, Oman and United Arab Emirates such localization or nationalization policies are referred to as Saudization, Omanization and Emiratisation. This shows that these countries have implemented some policies to influence the employment practices in public and private sectors (Rees et al. 2007).

According to Al-Dosary and Rahman (2005), the government of Saudi Arabia has tried to reduce unemployment of citizens. One of the most important steps that Saudi government has taken in regards to this is the Saudization or localization program. By this program the government tries to replace the expatriate employees with Saudis. Al-Harbi (1997) describes Saudization as the substitution of the overseas workforce with skilled and trained citizens in a planned manner that guarantees the continuation of smooth flow of the work state. Saudization can also be defined as a development

strategy that tries to substitute expatriate employees with citizens of Saudi Arabia, mainly through a range of employment quota targets (Al-Dosary & Rahman 2005).

Al-Dosary and Rahman (2005) indicated that Saudization program focuses predominantly on young workforce, especially local students, in order to overcome the high unemployment rate within youth group. In 2007, Rees et al. published a paper in which he explained that one of the intentions of Saudization is to overcome the drawbacks that are the results of employing expatriate staff. These drawbacks can be defined as social drawbacks such as cultural and religious values between citizens and expatriate employees, economic drawbacks such as foreign exchange and security such as blackout during possible crises. In addition, Al-Harbi (1997) mentioned that the program has three main objectives with are: increasing employment of Saudis across different firms of the domestic economy, reducing the dependency of the organizations to foreign workforce, and recapturing of the revenue that would go to overseas as payments and remittances to expatriate employees' home countries.

Such activities can be seen in other Gulf countries such as UAE. A special characteristic of the UAE is its demographic setting. According to United Arab Emirates National Bureau of Statistics (UAE NBS 2013), the total estimated population of the UAE in 2010 was 8,264,070 which only 947,997 of this population were UAE nationals. In other words, the percentage of UAE citizens living in the country was about 11.5 percent of the total population. The rest are foreign people that have gotten residence visa through sponsorship of a business partner, attaining sponsorship by an employer or by owning a freehold property. The emigrants that are about 88.5 percent of total UAE population can be considered as a result of development programs to turn the country as an economic power in the region (Mohamed 2002). Similar to other GCC countries, UAE is also trying to replace expatriates with citizens and local students. This is not only to just increase the employment of citizens, but also to invest in local students in order to assist them to improve their skills and experience. As Rees et al. (2007) explains, Emiratisation can be defined as the employments of UAE citizens in order to enhance their employability which would result in decreasing the country's dependency on foreign workforce.

According to Gulbrandsen and smeby (2005), graduate students are considered as a linkage of knowledge transfer from universities to industry, and also from industry to universities. Therefore, employment of graduate students after their graduation can be considered as a motivation factor for local industries to collaborate with universities. Employing graduate students is considered as a source of knowledge transfer from academia to the industry. Vinding (2004) explained that hiring graduate students causes innovation in the industry through three aspects. First, employment of graduate students adds scientific knowledge to the firm. Secondly, graduate students can have positive impact on the firm's capability in absorbing knowledge developed outside the firm. Third, graduate students can have significant impact in reduction of barriers to university-industry collaborations. As a result, recruitment of local graduate students not only provides the path for knowledge transfer and innovation between university and industry, but may also substitute the overseas workforce with skilled and trained local students in a planned manner that guarantees the continuation of smooth flow of the work progress (Waters et al. 2012).

In 2009, Thune pointed out that because graduate students are important for universities as researchers and for the industry as future workforce, collaboration between university and industry can enhance knowledge exchange between university and industry. In addition, training of graduate students in the industry is considered as a practice of reproduction of academic environment. Such trainings offered by industry would enhance the students' skills and knowledge which would prepare them to enter the market and enables them to adapt themselves with workplace environment much faster. This implies that training local graduate students would reduce the dependency of the organizations on foreign workforce, increases employment of citizens across different firms of the domestic economy, and assists recapturing of the revenue that would go to overseas as payments and remittances to expatriate employees' home countries (Mohamed 2002). In addition, Academic-industry collaboration is a practice where members of the academic and industrial organizations collaborate and help each other to achieve economic improvements (Toshihiro 2008).

In addition to all of drivers and motivation factors mentioned above, some barriers interrupt academic-industry collaboration. There are some obstacles that decrease the motivations of universities and industry sectors to collaborate such as: difference in

interests and attitude to research, lack of trust in the business market, imperil scientific independence, divert the attention from basic research to applied research and risk of affecting scientific reputation (Arvanitis et al. 2008). Such obstacles are highlighted by many scholars. The following section covers the barriers of such collaboration.

2.4 Barriers to Academic-Industry Relationship

Despite the advantages of academic-industry collaboration, there is evidence that even nowadays such collaboration is not noticeably happening in different places. Hall et al. (2003) investigated the reasons that some companies did not tend to cooperate with universities. For this purpose, they prepared a survey and passed to organizations that were not collaborating with academia. The collected data showed that most of companies identified intellectual property issues regarding commercializing the research outcomes which prevented cooperation with academia. Sometimes universities and industry could not reach an agreement regarding the credits of intellectual properties and new inventions.

Moreover, it could be construed that industry participants believed that lack of communication skills, not being able to respond to short-term needs, not being familiar with partners, lack of stable infrastructure for partnership and not having strategic plans were the weaknesses that universities had which affected the motivation for such collaboration (Kotnour et al 2001; Hall et al. 2003).

University policies were another issue that made the partnership difficult by interrupting the negotiations. Academia may face some extra problems in such collaborations. One of them is the negative effect that such cooperation may have on the traditional responsibilities of faculty. Collaboration of university faculty with the industry may take them away from their traditional responsibilities in the university. An example of this is the delay in publishing articles and results of the researches by university faculty (Hall et al. 2003). In 1997, Rosenberg and Nelson (1997) published a paper in which they explained that the collaboration between university and industry are somehow endangering academic standards and the reliability of academic researches done through the ethical framework of academic world. There is a belief that commercialism and cash would lead the academics' willingness to distribute their

research results among their university instructors and other partner universities. This can contribute to a primary change in the professional ethics that direct academic research (Rosenburg & Nelson 1997).

The distribution of funding can be referred to as another anxiety for universities. In 2002, Cohen et al. emphasized that some disciplines such as biotechnology, engineering, science, and medicine can obtain more budget in comparison to other disciplines like humanities which have less industrial collaborators. In addition, for most universities publications and conferences are more vital than patents and licenses. Many universities that have cooperation with the industry depend on research funding as a basis of income (Cohen et al. 2002).

According to Nimtz (1996), university-industry relationship has some revealed fundamental problems through the company, university, or working environment. Communications and knowledge sharing are some of these problems. They identified these issues when they were examining the cooperation between a university and a private company in the United States. In 1990, Marshall explained that some other problems such as interest conflicts and disclosure issue took place.

Campbell (1997) also addressed some matters regarding university and industry partnership in her article. She mentions that clashes of interests, intellectual property, and confidentiality as some additional concerns for such partnerships. Inventions or discoveries can be classified as intellectual property. Financial and economic concerns can be the reason of clashes of interest for both academia and industry. From the academics' view, clash of interests may happen because of an academic members' commitment to their universities as this is linked to publication of research results. Academic members may prefer to keep the research results confidential until the patenting procedure is finalized which may lead them to attain more profit. This is against their commitment to research and service. Clashes of interest issues are increasing as university-industry collaborations grow (Geiger 1989).

Another barrier to academic-industry collaboration can be related to geographical locations of the universities and companies. According to Thomsen (1997), these partnership environments would bring profit and income to universities in the form of patent and licensing rights as well as knowledge transfer resources. However, most of

the time, cooperation occurs because of geographical location of the companies and universities. As a result, sometimes university-industry cooperation does not happen because of failure of these two communities to unite and work together. In some European countries, smaller universities are not capable of undertaking researches because of their geographical location. Therefore, such universities are left out of from partnership with the industry (Thomsen 1997).

In their paper, Etzkowitz and Leydesdorff (2000) explained that by such collaborations, previous infrastructures of universities are being changed to new infrastructures. Some of these replacements can be changes on university and academic institutions campuses such as developing the technology licensing offices to control technology transfer. It is mentioned that the organizational refusal to get rid of old system while transferring to new arrangements would increase the clashes of interest among the partners (Etzkowitz & Leydesdorff 2000). Blumenthal and Campbell (2000, p.129) explain that academic-industry collaboration “cannot and should not be prevented. But their benefits should not be exaggerated, nor their risks be minimized or ignored. It is essential that these relationships be understood, monitored, and managed in a manner that protects the investments and the integrity of involved individuals, institutions, and science in general. Failure to do so could result in loss of public confidence and support for research enterprise-a priceless resource whose integrity and independence are critical to the future of the scientific endeavour.”

In addition to mentioned barriers, the cultural difference between industry personnel and academics is discussed by many scholars. This important source of conflict is covered in the following section.

2.4.1 Differences in Academic and Industry Cultures

There is always the possibility of occurring conflicts of interests when two cultures of academia and industry are trying to simultaneously achieve their aims and goals. The decrease in federal research funding and the increase in markets technological competitive make the academic-industry collaborations more attractive. But sometimes university faculty' concern rises when they think that such relationship and the funding offered by industry organizations may affect the university curriculum (Allan 2001).

According to Killeron (1986), the conflict occurs when some researchers try to protect academic research from all possible effects from outside. On the other hand, sometimes the industry expects academia to change or modify their university curriculum in order to achieve industrial objectives, provide licensing and patent rights to industrial organizations. However, universities and academic institutions are dependent on financial supports of other firms so that they cannot stay away from industrial organizations. They need to merge their objectives of teaching and academic researches with commercial aspect of their researches. This can be referred to as an issue for universities as the funds offered are mostly for applied researches rather than basic researches (Sparks 1985).

It can be deduced from the literature that academia and industry have their own cultural system. Alvesson (2002) mentioned that “anthropological and sociological approaches tend to define culture as a set of attitudes, beliefs, customs, values, and practices which are shared by a group.” Organizational culture can be described as a model of shared and common assumptions and beliefs of a group that solves its issues. If such solutions solve the issues, the assumptions would be recognized as acceptable and would be transferred to other members of the organization as a method to implement when same problems occur. Therefore, it can be understood that each organization has its own and exclusive culture according to its members’ beliefs and values (Cheung et al. 2011).

In university and industry relationship, the culture of each party would be determinant of the type of information sought. As a result, the culture of each party has the role of knowledge-control system (Alvesson 2002). According to Hatakenaka (2004), the interior and exterior organizational margins affect the development and content of collaborations. Academia and industry both have their own different interests and objectives and this makes it difficult for them to get to a common understanding in order to work together. As an example, in universities, researchers are awarded for investigation, analysis, and sharing new scientific information and knowledge. On the other hand, industry recompenses the value that a new creation would transfer to the market (Audrestch & Stephan 1996).

Research institutions and universities have a mutual culture defined by educational freedom and independence in their work (Cain 2002). Academic culture is led by a professional ethic with research done in an academic atmosphere. Academia is encouraged by the aim of attaining knowledge for the sake of knowledge so that the main accountability is to the society and not limited to a number of investors. Nevertheless, Albatch (1999) argues that academic culture should not be generalized. Educational systems are complicated and usually directed by the institution and university departments and not by a general professional standard. In addition, social changes lead universities and industry to reassess their conventional cultures in order to encounter the anticipation of a global economy (Cain 2002).

Usually organizational and academic structures are in clash (Hatakenaka 2004). To avoid this, Killeron (1986) suggested that it is vital for universities and academic institutions to develop internal policies in order to push faculty and students towards contribution to industrial attempts. Another conflict occurs because of different aims and objectives of the both different academic and industrial cultures. Industrial research is according to specific requirements of industrial organizations and often the results of the researches remain confidential to the involved organizations, whereas university basic researches are usually according to scientific investigation which the results of the researches are disclosed publicly (Muir 1990).

Profits and income received from academic research can be considered as another issue within some sectors. It is likely that sometimes the profits and income switch the concentration of faculty and academic instructors from teaching (Sparks 1985). Muir (1990) emphasized that university faculty who have industrial help for their researches and guide industrial organizations by their consultations may divert their concentration from their responsibilities as university faculty. In addition, the objective of universities as centres of teaching and research may be affected by profit and financial supports attained from their researches (Cain 2002). In 1985, Sparks pointed out that academic research moves toward specialization in exclusive technological field with projects that need huge investment in equipment. New equipment and facilities are important for university faculty and research team. Such facilities reduce the industrial sponsorship costs, and provide the possibility of sharing basic and applied research.

On the other hand, industry organizations have a mutual culture that is directed by a business ethic. Such ethic functions in an environment relying on competition and is encouraged by financial aspects (Cockrell & Stone 2010). The main goal of most businesses is to attain cash from the stakeholders, while the stakeholders look forward to gain profit from their investments. Interior and exterior changes can be defined as drivers of cultural adaptation and adjustment as organizations tend to get closer to new changes (Witte & Muijen 2010).

Sparks (1985) explains that in the United States, the majority of basic research studies are done in universities. Enhancing the cooperation between the two cultures guarantees that industry utilizes the results obtained from basic research to enhance their competitive advantage. At the same time, industry assists universities by giving them necessary directions for doing research. Meanwhile, universities should be interested in doing research projects that are useful to the industry, and industry needs to utilize the research results that are reported by universities. It is essential that university researches communicate and coordinate with industrial staff regularly in order to adjust the universities researches with industry's requirements which would result in products improvement (Muir 1990). In addition, Killerton (1986) mentioned that it can be felt that there is a need for being flexible in collaboration between industry and academia in order to overcome possible conflicts. Universities are usually blamed for not adhering the research schedule and plan, and respecting the deadlines of finalizing the research projects.

In addition to reasons, drivers and barriers to university-industry collaboration, it is useful to identify the types of such collaboration. University-industry cooperation can be implemented in different ways. And scholarly studies have attempted to organize such collaborations according to different types. Different types of academic-industry relationships are explored in the next section.

2.5 Types of Academic-Industry Collaboration

Academy-industry collaboration has different types. In 1989, Geisler and Rubenstein (cited in Link and Tassej 1989), categorized academic-industry cooperation into four types. First category is industrial additional services, second is procurement of

services, third category is described as cooperative research, and the last type is research parks. Table 2.1 demonstrates the summary of Geisler and Rubenstein's categories in academic-industry collaboration:

Category of academic-industry collaboration	Explanation and mechanism
- Industrial additional services	- knowledge transfer and consultation - undirected corporate rewards to academic institution funds - financial support to university departments and laboratories
- Procurement of services	- What universities attain: sample development, practical and real life training for university students and dissertation topics. - What industry: training of employees, education of employees like post graduate programs and contract research.
- Cooperative research	- joint research projects - direct collaboration between academic institutions and industry professionals on the projects of shared interest - industry fund and aid for researches done by university which the results of the researches are attractive for the industry
- Research Parks	- contractual arrangement - research partnership regarding technology and innovation

Table 2.1 Categories of Academy-Industry Collaboration
(Geisler & Rubenstein 1989 (cited in Link and Tassef 1989)).

In 1989, Fairweather also introduced a topology of such cooperation. He explained that formal cooperative research contracts, education and training, research contracts with faculty, payments from industrial organizations, consultation and training for occupations are the most common motivators that encourage academic institutions and industrial organizations to work together. Table 2.2 demonstrates the summary of Fairweather's categories in academic-industry collaboration:

Category of academic-industry collaboration	Explanation and mechanism
- Academic purpose	- Research-related cooperation: - o Knowledge transfer - o Technology transfer - o Applied science - Instruction-related cooperation: - o Post graduate educational programs - Administrative-related cooperation: - o Advisory boards
- Industrial purpose	- Business-related cooperations
- economic growth	- Economic researches - Human resource development - Technology transfer
- organizational location	- Members of faculty team - Formal research departments
- understanding of working relationship	- Sharing of objectives
- collaborative mechanism	- capital and funds - Research contracts and grants - Technology/Knowledge transfer: conferences and publications - Training: cooperative education, post graduate programs

Table 2.2 Categories of Academy-Industry Collaboration
(Fairweather 1989)

By comparing the above categories provided by Geisler and Rubenstein and Fairweather, it can be obtained that both are considered function, location, and method. Whereas Fairweather mentions academic and industrial functions, and economic growth, Geisler and Rubenstein point out industrial addition services, procurement of services and cooperative research as motivators of university-industry collaboration. In addition to location of the university, Geisler and Rubenstein offer the research park as a location for such cooperation. On the contrary, Fairweather breaks down inter- and intra- organizational sites where such collaboration might take place (Feldman et al. 2002).

3. Research Methodology and Approach

3.1 Overview

The intended scope of this research was to examine the relationship between academia and industry in terms of possible mutual benefits. There was specific focus on how to enhance academic-industry collaboration, knowledge sharing and methods of such collaboration. The principle of qualitative research methodology was used in this research in order to attest information attained from the literature and to collect data from academics and industry experts. According to Saundres et al. (2007), qualitative research method tries to explore and study a social issue from different viewpoints. The purpose of utilizing qualitative research method is to attain direct and comprehensive information about how academic-industry relationship is being implemented in the United Arab Emirates.

3.2 Purpose of Research

Research purpose can be classified in three types: exploratory, descriptive and explanatory. However, more than one type can be utilized in a research paper (Walliman 2011). Exploratory approach is used by researchers to simplify understanding of a problem, or to provide an extensive knowledge background of the research subject. Moreover, this kind of research is helpful when there are limited researches about the subject. The way of doing exploratory research is through critical literature review and collecting data by interviewing experts of the fields that are related to the research topic (Saunders et. al. 2007). Regarding the second type which is descriptive studies, the researcher should have a clear image of the phenomena on which the required data will be collected. This type of research can be considered as an extension stage of other two research types, exploratory and explanatory. Lastly, the explanatory research is conducted in situations that fundamental relationship between different variables required to be established (Walliman 2011).

Considering the dissertation topic, which is about academic-industry relationship and the impact of such relationship on each party, the research can be considered as

exploratory in nature. The issues that such relationships face should be explored and limited resources are available to address such issues. Interviews should be conducted in order to collect necessary data to be analyzed. Therefore, this can be considered as an exploratory type of research purpose.

3.3 Research Method

Qualitative data cannot be precisely measured, and are mostly stated in words rather than numbers. Basically, human activities like beliefs and ideas that are examined in the research cannot be measured in an accurate way. Thus, these types of data are considered as descriptive in character. Interview transcripts, minutes of meetings, documentary films are some types of qualitative data (Walliman 2011, p.99). Although questionnaire surveys are quite easy to establish, they have some certain issues. The main issue of questionnaire surveys is their limited flexibility. Therefore, interviews are more appropriate to get answers for questions that need inquiry to attain proper information (Creswell 2009, p. 250).

According to Walliman (2011, p99), there are three types of interview: structured interview, unstructured interview and semi-structured interview. Structured interview contains consistent questions asked by the interviewer based on a fixed plan and the answers are usually in a closed format. On the other hand, unstructured interview is set in a flexible format. This type of interview is generally according to a question guideline that is set by the interviewer. However, answers are flexible in order to understand the attitudes of the interviewee. Semi-structured interview is consisted of structured and unstructured divisions with consistent and open type questions.

Creswell (2009, p.251) explains that in qualitative interviews, the researcher performs face-to-face interviews that consist of structured, unstructured or semi-structured questions. The researcher asks the questions in a way to realize views and ideas of the interviewees. Therefore, for this research, semi-structured interview was conducted not only to attain answers to planned questions, but also to understand views and opinions of the participants. Interviewees' voice was recorded in order to be able to review the answers several times. Although the interviewees' voice was recorded, necessary notes

were taken in case the voice recorder fails to operate. According to Creswell (2009, p.263), researches can record information from interview participants through different ways such as taking notes, audio or videotaping. Even though interviews are taped, it is suggested to take necessary notes in order to prevent information loss in case the recording equipment does not function properly Walliman (2011, p111).

The interview Guide

An interview guide is a group of questions or issues to be studied in the form of an interview. The interview guide is created to assure that the same information is attained from a group of people covering the same materials (Patton 2002, p.282). There are three methods of qualitative data collection using interviews, which are informal conversational interview, general interview guide method, and standardized open-ended interview method Creswell (2009, p.263). Patton (2002, P.283) explains that informal conversational interview is an interviewing method that depends on the natural flow of a dialogue to produce unplanned questions. General interview guide method includes listing a group of questions and issues that need be explored with each interviewee before interviewing starts. The guide functions as a checklist for the interviewer to assure that all of related topics are discussed and responded during the interview. Standardized open-ended interview method includes a group of questions that are wisely worded and organized in order to have each interviewee in the same path and to ask each interviewee the same questions with the same words.

In this research, general interview guide approach is followed in order to list questions in a way to make sure that interviewees cover all related topics. The interview guide consisted of questions for academics and industry personnel, which was prepared to attain required data to address all of the research questions (Appendix A&B).

Pilot Interview

A number of draft interview questions were prepared based on the information attained from the literature. Before conducting a pilot interview, the draft interview questions were revised twice. Pilot interview makes it easy for the researchers to identify

whether the interview questions are ambiguous or the questions are probable to correspond reasonably with interviewees experiences. It allows the researcher to make required changes and adjustment to the interview questions before conducting the main interview for data collection. Analysis and study of the pilot data ascertains the efficiency of interview questions (Barribal and While 1993).

After revising the draft interview questions, two pilot interviews were conducted which one of the pilot interviews was conducted with a faculty member of a university and the other one with a person from industry. The reason of conducting such pilot interview was to identify whether the interview questions are prepared in a proper way that helps the researcher to collect necessary data for the research or not. The outcome of the pilot interviews was satisfactory and interviewees responded to questions in a way that required data could be collected. Besides some minor changes, no major changes and adjustment needed to apply to the interview questions before starting the official interviews. Therefore, the data collected from the pilot interviews were used in the research analysis as well.

3.4 Sampling

Academia

Six faculty members from three universities in the United Arab Emirates were selected to answer the interview questions. Selected universities are British University in Dubai (BUiD), American University of Sharjah (AUS) and Canadian university of Dubai (CUD). AUS and CUD universities offer both undergraduate and postgraduate programs, while BUiD offers postgraduate program only. Such selection was done purposely. This is because postgraduate universities focus more on research in compare to universities that offer undergraduate programs only. Hence, it was important to select faculty members from universities with postgraduate programs that might have more connection with the industry. The followings are brief descriptions of each selected university.

British University in Dubai

British University in Dubai (BUiD) is located in the north-west of United Arab Emirates and was established in 2004. BUiD is the first research based postgraduate university in the country. Since its establishment, the university has experienced rapid growth regarding number of faculty and students. The university has connection and partnership with well-known abroad universities such as University of Manchester, Cardiff University, University of Edinburgh, University of Birmingham, King's College London and Reading University.

American University of Sharjah

American University of Sharjah (AUS) was established in 1997 and it is located in the north-west of United Arab Emirates, city of Sharjah. This university provides about 25 majors at undergraduate level and 13 master degree programs through College of Engineering, College of Architecture, College of Arts and Design and School of Business and Management. AUS is ranked among top universities in the Middle East.

Canadian university of Dubai

Canadian University of Dubai (CUD) is located in Dubai, the largest city of the United Arab Emirates. It was established in 2006 and provides different programs at undergraduate and graduate levels.

Characteristics of Interviewees

Three faculty were chosen from British University in Dubai, Two faculty members from American University of Sharjah and one faculty member from Canadian University of Dubai. All of the six faculty members were males. Regarding academic rank, four faculty members were professors and two were associate professors (Table 3.1).

Interviewee	University	Position	Program
A1	BUiD	Professor	Faculty of Business
A2	BUiD	Professor	Faculty of Business
A3	BUiD	Associate Professor	Faculty of Engineering & IT
A4	AUS	Professor	Faculty of Engineering
A5	AUS	Associate Professor	Faculty of Engineering
A6	CUD	Professor	Faculty of Engineering

Table 3.1 Characteristics of Academics Interviewees

Industry

Six persons from industry personnel were interviewed from six different organizations in the UAE. Each of the interviewees had different positions in their organizations, which allowed the researcher to collect data and to acquire ideas and views of different people in the industry with different positions (Table 3.2).

Interviewee	Company Category	Position	Location
B1	Construction – Subcontracting company	Commercial Manager	Dubai - UAE
B2	RTA	Chief Engineer	Dubai - UAE
B3	Construction - Consultant	Senior Projects Manager	Sharjah - UAE
B4	TECOM Investments	Strategy Consultant and Educational Director	Dubai - UAE
B5	Architectural Engineering	Executive Projects Manager	Abu Dhabi - UAE
B6	MEP Contracting	Contracts Manager	Abu Dhabi - UAE

Table 3.2 Characteristics of Industry Interviewees

As presented above, the samples were selected in a way to attain ideas from people in different universities and companies with different positions. This would help the researcher to attain different views of academics and industry personnel. The next chapter provides analysis and findings of data collected.

4. Data Analysis, Findings and Discussions

4.1 Introduction

This chapter includes analysis of data collected during the research. After the introduction, section 4.2 shows how collected data provides information about reasons and drivers of academic-industry collaboration in the UAE and presents a comparative analysis against factors derived from the earlier literature review: knowledge transfer, knowledge transfer/sharing, innovation, and localizing workforce. In addition to drivers, the barriers towards such collaboration in UAE will be compared to the findings of the literature. Conclusions will be developed based on the attained information in the next chapter.

4.2 Description of the Data

4.2.1 Reasons for academic-industry collaboration

This section explains the view of university faculty members and industry personnel about the reasons for academic-industry collaborations. Interviewees were asked to explain what reasons encouraged them to enhance such relationship.

Universities require attaining other sources of income rather than just relying on government sources or revenue they obtain from students tuition fees. A university professor (A1) indicated that:

It (funding) is an important one. Because most of the time we cannot do research without financing. You need to buy equipment, hire (research) assistants, and we need some supports. All of these require money. Therefore, the financial aspect is important.

All of faculty members explained that there is an increasing need to get industry closer to universities. One of the reasons that almost all of the respondents from universities mentioned was the financial aspect. An associate professor from faculty of engineering and IT (A2) explained if companies could not provide him required facilities, assets, and laboratories, they should offer him funding:

If I want to work with them (industry) as a researcher, I would expect them to be able to contribute to what I am doing. I need funding. I need facilities to conduct experiments. Therefore, if I see any company, even if they do not offer money to fund my research, can provide facilities for experiments, I would work with them.

However, some academics stated that if companies can offer them knowledge instead of financing their researches, they would cooperate with them:

If they cannot offer funding, I need to learn something from them. I need to attain knowledge. (A5)

As mentioned in the literature, this correlates with what Peters and Fufeld (1982) pointed out. They explained that industry could be referred to as a source of profits and income for the academic institutions. In addition, other aspects like no sufficient support from government and the incentive of making revenue can be added to the reasons that universities tend to cooperate with the industry (Baba 1988).

According to Peters and Fufeld (1982), some specific research funds offered by government are obtainable only by university-industry cooperation. In confirmation of this, a university professor (A5) explained that some certain funding can be attained from government only through interacting with the industry in the UAE:

We are currently working with a construction consultancy company in Dubai and trying to prepare a research proposal in order to submit for the National Research Foundation (NRF). I hope that we get some money by doing such researches.

The national Research Foundation (NRF) was established in 2008 to assist enhancing research activity in private and public universities, colleges, and companies in the

United Arab Emirates. NRF offers financial supports and funding on a competitive basis to researches from universities, industry, and institutions in the UAE.

In addition to financial benefits from academic-industry research partnerships, attaining knowledge and getting familiar with real life problems and issues within regional companies are considered as reasons for academic-industry collaboration. University students can find out the problems that local companies are facing. This would help them to learn more about real life issues and such issues can be used as their thesis topic. A professor from faculty of engineering (A3) mentioned that:

We invite industry personnel to give lectures to our students. They can share their experience at work, address the problems and issues they face, and the methods they use to solve their problems. They will explain to our students their practices that are not written in the textbooks and other publications.

Another university faculty (A4) also added that:

Faculty members try to get real life problems from the industry, study and do research on them, probably with the help of their students. So they can publish the results.

One of the reasons that academia tend to have closer relationship with the industry is to enable students to get familiar with the real world projects in addition to dissertation topics (Rubenstein and Geisler 1989). Responses obtained from university faculty imply that providing students with real life examples and identifying issues that local companies face can be considered as one of the reasons that faculty try to interact with industry in the UAE.

On the other hand, the data and information gained from industry personnel showed that most of them do not have significant collaboration with academia. However, a chief engineer (B1) from a Road and Transport Authority (RTA) in Dubai reported that the organization, which he works for, is initiating collaboration with the local universities:

Recently initiatives started in our organization in which we are trying to share the lessons learned from different projects we have

implemented such as Dubai metro project, road and bridges construction projects with local universities to give them documents and information about design, implementation and other aspects of the projects. This may lead university students to do research about the projects and come up with new ideas and suggestions. However, I must say that this is a new practice in the country and requires some works to be done to enhance such relationships.

Industry organizations can use such relationship to interact with university faculty and students and employ graduate students for their companies. Employment of graduate students adds scientific knowledge to the firm, and graduate students can have positive impact on the firm's capability in absorbing knowledge developed outside the firm (Vinding 2004; Sparks 1985). As pointed out by an executive project manager (B5):

(By academic-industry collaboration) students would have better opportunities in getting a job and progressing in their career.

Collected information from respondents from academics and industry employees show that in the UAE, university faculty tend to collaborate with local companies in order to keep themselves updated regarding the real life projects and activities in the industry within the country. Moreover, they are keen to conduct their researches in partnership with industry organizations to attain required facilities and financial supports for their researches. On the other hand, companies in the UAE are less interested in investing on research partnerships with local universities compared to companies in US and Western countries. However, industry's willingness to collaborate with universities has started to increase recently.

4.2.2 Motivators for academic-industry collaboration

In addition to mentioned reasons for academic-industry interaction in the previous section, some motivation factors were pointed out by interviewees from industry and universities as drivers of such interaction. One of the factors that most of the respondents stated is innovation. According to Romer (1990), innovation is one of the

mechanisms of academic-industry relationships. Innovative ideas play an important role in local economic development. Local innovation abilities positively affect the productivity and therefore growth in the region. A contracts manager (B6) from a MEP contracting company in Abu Dhabi explained that:

If the (university-industry) collaboration goes further in the UAE and more activities happen in this regard, we can get innovative ideas from graduate students, study and develop such ideas to come up with innovated solutions for issues we face.

Similarly, a strategy consultant and educational director from TECOM in Dubai (B4) stated that:

Once universities are engaged in research and they find something new, they can share it with their industrial sponsors. Then the companies can use this to expand their business and end up with a new product.

The responses gotten from interviewees confirm that innovative ideas of academia and students can be classified as an important motivation factor for industry to collaborate with universities. One university professor (A6) pointed out that innovative ideas, which arise from universities, encourage regional companies to have connections with academia:

We (university faculty and students) offer them (industry) new knowledge, innovative ideas in different aspects. We offer them new techniques and best practices in managing people and organizations.

The above example shows that university professors in UAE believe that they can add benefit to local companies by offering them innovative ideas to solve their problems and issues.

Beside innovation, knowledge transfer and knowledge sharing is another key factor for such interaction. The importance of this factor can be observed from answers received by respondents. The following is the response of a university professor (A1):

We can start to transfer knowledge by investigating about experiences of other countries about how things were applied there and try to see if we can modify them to be applicable for companies in the UAE. So that, they can develop their work, make it more efficient and profitable. This would let them even find new value of their business. We can offer things they have never thought about them in the past that they can apply in their business.

Another professor (A2) explained how academia could attain knowledge by such relationship:

I invite managers from different companies in the UAE to give lecture to my students. They share their experience based on their jobs. We (university professors) teach in classrooms based on our research experiences and our previous experiences in the industry. Once I invite people from industry, they explain their practices at work to students. It helps student to understand the difference between what they learn in the classrooms and what is going on actually in the industry.

These examples support what was explained in the literature chapter. Academia tend to collaborate with other regional companies in order to get familiar with real life issues and provide innovative ideas to solve those issues by conducting research (Freitas et al. 2012).

Beside university professors mentioning knowledge transfer/sharing as an incentive factor that leads academia to cooperate with local companies, some interviewees from industry also agreed that their experience at work would help students and academia to know more about real life work process by sharing their experience:

We can share the lessons learned and our experience from different projects that we have implemented with universities in the UAE. We can provide them information about design, execution and other aspects of our projects. (B1)

However, respondents explained that knowledge transfer should be from both sides. They think such relationship should be in a way that knowledge is transferred from

industry to academia and from academics to the industry rather than one sided knowledge transfer. The next example illustrates this aspect:

It (academic-industry collaboration) has to be hand in hand. Both sides should benefit from such relationships. Otherwise, it would lead them to lose their interest in collaborating with each other. (B3)

The responses confirms the knowledge transfer/sharing as a key factor for academic-industry collaboration in the UAE. As mentioned in the literature, knowledge and technology transfer between universities and business firms is defined as a motivation factor for both the business firm and universities (Eom & Lee 2010; Haeussler 2011).

Because of special conditions of workforce in the UAE, the government has planned a program in order to enhance the participation of citizens as skilled workforce in private and government sectors. A positive bias can be seen regarding companies that use more locals as their workforce compared to organizations that mainly use employees from overseas. This is not only to encourage employing citizens instead of foreign workers, but also to invest in the local students in order to assist them to improve their skills and experience. Therefore, localizing skilled workers could be a driver of university-industry partnership in the country.

The data collected from respondents show how local graduate students can have positive affect on such collaboration. A faculty member, for example, explained how his local students help him to be in relation with the industry through different ways:

Our Emirati students help us in bringing in speakers from outside. They have personal contacts and relations with managers of different companies, especially government sectors. We can invite them through our Emirati students to give lecture. So our students can hear from them about their work process and experience. Moreover, we were able to arrange some site visits through our local students, which helped our students to know more about industry and actual work environment. (A6)

Another faculty member of a local university mentioned:

Having local students help them to interact with industry easier, especially if we are dealing with government institutions rather than private businesses. They feel more comfortable or more interested to cooperate if they find locals are included in the researches. (A1)

According to Gulbrandsen and smeby (2005), students are considered as a linkage of knowledge transfer from university to industry, and from industry to university. Thus, In UAE, engaging local students as research assistants can improve the interaction between academia and industry as stated above.

A university professor mentioned that he could achieve to attain money from Emirates Foundation by using his local students for doing research. Emirates Foundation is an independent organization established by the Government of Abu Dhabi. This organization provides funding for researches implemented by universities in the UAE.

There was a special point in the conditions of providing research funding to us, which indicated that I must hire at least two Emirati students out of three required research assistants. (A4)

This implies that if university faculty in the UAE use their local students in doing research projects for companies, they would have a good chance to get money from specific local organizations such as Emirates Foundation. This would encourage university faculty to hire local students as their research assistant. Therefore, Emiratisation can improve collaboration between universities and the industry.

However, there are some issues in localizing workforce. Data collected from interviewees complement what (Rees et al. 2007) mentioned in his article. He addressed the policies that Gulf countries implement to influence the employment of local students in public and private sectors. However, there are some limitations in this aspect. For instance, a commercial manager in a well-recognized private construction company in the UAE stated that:

All the companies in the country have to hire some certain percentage of their staff from UAE citizens by the law. For me as a manager in a private sector, it does not matter where my staffs are from. What is important for me is how they can add value to the company... There

are some positions such as administrative works that you can find local workforce who can fill the positions easily. On the other hand, it is difficult to find Emiratis who are willing to work in technical positions such as welders and sometimes even site engineers. (B2)

Moreover, university professors also addressed some issues regarding hiring Emiratis as workforce for companies:

Unfortunately most of our local students who are sponsored by government, they are not willing to work in positions that require solving technical problems. They want to work mostly in management positions. It is probably because they can find job in such positions easier with higher salary in compare to expatriates. (A3)

Another university professor talked about the issues of using locals as research assistants:

There is a restriction in using local students as research assistants. In certain fields, we do not have enough local students who are interested to do research. Sometimes we have problems in finding suitable local students to do the research. It is good that the government likes to use and encourage local students to work, but sometimes this is a restriction if you do not find people to work in the research area. We, as university faculty, understand the reason for Emiratisation and the willingness to encourage local students to participate in researches, but they should be aware that it is not something that you only wish! There are not always enough local students in some certain fields. In our university for instance, in areas like project management you can find many locals. However, in areas that are highly technical, such as system engineering, there are no locals. Moreover, most companies are facing technical issues. I think they have to be pragmatic when they ask for locals. (A1)

The responses of interviewees indicate that although local students and the concept of Emiratisation can improve collaboration between academia and industry in the UAE, it has some limitations as well. Most respondents mentioned that local students often

tend to study management programs rather than other technical programs. This would lead to lack of skilled local workforce in technical areas. Therefore, encouraging local students to study and work in technical fields can be helpful in improving their technical skills and therefore academic-industry relationships.

Besides all of drivers and motivation factors mentioned above, some barriers interrupt academic-industry collaboration in the UAE. Such obstacles are discussed in the following section.

4.2.3 Barriers to Academic-Industry Relationship

In addition to motivation factors discussed for academic-industry interaction in the previous section, some factors were pointed out by interviewees from industry and universities that interrupt such relationships. One of the factors that most of the respondents mentioned during the interview is organizational culture and industry's trust on academics in the UAE. As explained by Hatakenaka (2004), academia and industry both have their own different interests and objectives and this makes it difficult for them to get to a common understanding in order to cooperate together. In the following, different examples are mentioned that can illustrate a range of issues that can result from organizational culture and lack of belief on academics. A manager (B2) from a private company in the UAE explained that:

If managers from industry believe that a college or university with academic research would be able to help them to improve their qualification and performance in the market, they would start interacting with universities. If they do not believe this, such interaction would never happen. The problem in the UAE is that decision makers of companies lack this belief. They prefer to rely on their experience in the market rather than approaching universities to solve their problems.

This example shows the lack of trust on academics from industry. As stated in the literature, trust, relationship and culture are the important factors that positively affect

knowledge transfer within organizations (Davenport & Prusak 2000). Collected data indicates that many companies in the UAE lack such important factors. Some faculty members also referred to organizational culture as an impediment to such collaboration in the country.

Not all, but some issues within companies can be solved through conducting research. The industry can provide information regarding their problems, and universities can do research in order to come up with valuable results. These results can be used by industry to improve their performance, and academics can publish the results in publications. However, I do not see too many companies that are eager to contact local universities to solve their problems. This is not in companies' (in the UAE) culture to rely on local universities and they do not believe that local universities are capable of solving their problems. (A3)

The followings are three more examples that indicate the lack of trust:

Most of companies in the region are not willing to ask regional universities to solve their issues. They prefer to consult with other companies that are located in other countries like United States or United Kingdom rather than relying on the local colleges. (A6)

Industry personnel try to pay for consultants from western countries rather than approaching universities here. (B6)

In fact, most of companies in UAE market try to buy the expertise of external consultants, which comes from Europe or America. They bring consultants to the country for few days or weeks and let them work on the projects. After getting the result, they would fly back. It is very rare that they approach local universities to ask them to provide solutions for their problems. (B1)

According to Roberts (2000), mutual understanding, support and trust can be classified as vital values for a succeeded and effective industry-academia relationship. The above examples showed that there is lack of trust on academics from industry personnel. Therefore, lack of trust can be considered as a barrier to such collaborations.

In addition to cultural aspect, another barrier factor that was mentioned by a respondent from industry is the confidentiality of organizations' information. As mentioned in the literature, confidentiality can be considered as a factor that negatively affects university and industry partnerships.

One of them (barriers) is organizational culture and the other one is university culture. It is a two-sided issue. There is barrier regarding the culture from industry and from the university as well. One important aspect is the knowledge sharing. In many companies, managers tend to keep their companies' information confidential, and they are not that keen to share it with universities. The universities can only work on issues when companies share with them the full information. When they share with them part of the information, academics are handicapped which would prevent them from producing something valuable for the companies. (B3)

This correlates to what Campbell (1997) explained in her article. She addressed that intellectual property and confidentiality are considered as concerns for such partnerships. Fiaz and Naiding (2012) also pointed out that industries tend to confine their exclusive knowledge to be closed and keep them secret.

In some cases, time is another issue that influences academic-industry partnerships in UAE:

Most of people in the industry are so busy with their projects and their aim is to deliver their projects on time. They do not devote that much time for such relationships. Thus, there is less focus and priority in developing relations with universities. It (university-industry collaboration) needs time and requires someone to follow up.

Moreover, universities faculty in UAE are also busy in delivering lectures and teaching, and they are less focused on research. It is because the type of educational systems of UAE universities is mostly course based rather than research based. (B1)

The above example shows that some companies prefer to focus on their projects in order to deliver them on time, rather than allocate some time for cooperating with universities. Time, as a barrier factor, is also mentioned by a university professor:

At the end, it is all about dirhams. Industry people do not believe that they can get back the desired outcome immediately by such collaboration. Therefore, they are not keen to allocate their time for it. (A5)

In confirmation of the above example, Fiaz and Naiding (2012) mentioned that time is sometimes a preventing factor for academic-industry relationships. They explained that firms tend to give priority and concentration on immediate results while academics usually spend long time for their researches.

Another possible barrier that was mentioned in the literature is the financial aspect. Financial benefit is identified as a motivator factor for academics in collaborating with industry. In contrast, it could be seen that in the UAE, companies are not willing to spend money on researches. Thus, financial aspect can play the role of a demotivating factor as well. A part of it is related to the industry culture. As discussed above, most of industry decision makers in the country do not trust or believe in academics ability in offering a practical solution to their problems. A professor from faculty of engineering explained about this:

Financial aspect is a barrier in the UAE. They (industry) are not willing to pay for research because they are not sure that the outcome of the research would be useful. (A2)

The above example relates to what Campbell (1997) mentioned. She indicated that financial and economic concerns can be the reason of clashes of interest

for both academia and industry. It is very rare that industry decision makers tend to invest on industry-academic collaborations.

Another respondent indicates:

Their main issue is usually financing. The problem is most of the industries in the country tend to be copycat industries. Essentially, they do not develop anything in-house. This means that they do not see the reason to invest in research. (A5)

The last example illustrates that another reason that companies in the UAE are not willing to allocate budget for research is because most of them do not develop things in-house. Therefore, it is too rare that they decide to invest on research. They often follow other companies and in case they face any problems, they prefer to pay money for a consultant to solve the problems rather than investing on a research in partnership with local universities. This is confirmed by a respondent from industry:

UAE managers usually try to solve their problems using the traditional way, which mostly based on their work experience. In very rare cases that we face a problem, which cannot be solved within our organization, we try to use the experience of our colleagues in other companies or hire a consultant from overseas. (B4)

4.3 Chapter Summary

In this chapter, the academic-industry collaboration practice in the UAE was analyzed. The data collected from respondents were studied and compared to the literature. It could be obtained that such collaboration in this country is quite different from the same in western countries and US. Drivers and motivation factors for such collaboration were identified. In addition, the barriers and demotivate factors that negatively affect the relationship between universities and industry in the region were explored. The following chapter provides outcome of this research as conclusions, and a set of recommendations to enhance such collaboration in the country is provided.

5.0 Conclusions and Recommendation

5.1 Conclusions

The results and findings from the research have led to the following conclusions to be obtained based on the objectives of the research which are:

- Objective 1. To know the status of academic-industry collaboration in the UAE
- Objective 2. To identify reasons and drivers of academic-industry collaboration in the country
- Objective 3. To explore challenges and barriers towards such relationships
- Objective 4. To identify expectations of different stakeholders of such collaboration

The main conclusions from this research are:

- Conclusion 1. There is no noticeable academia-industry collaboration in the UAE; however, such collaboration is initiated recently and can be improved.
- Conclusion 2. Financial benefit is one of the main motivators for university faculty in the UAE to collaborate with industry.
- Conclusion 3. Knowledge exchange and getting familiar with real life issues are another reasons that academia tend to collaborate with industry in the country.
- Conclusion 4. Innovative ideas of university faculty and students are considered as motivators for industry personnel to get involved in such collaboration.
- Conclusion 5. Updated knowledge of academia is considered as a motivator for industry personnel to get involved in such collaboration.

Conclusion 6. Emiratisation is a motivation factor that is specific to the UAE. Localizing workforce encourages both academia and industry to collaborate with each other.

Conclusion 7. Organizational culture and lack of trust on academia from industry personnel are obtained as the main barriers to academic-industry collaboration in the UAE.

Conclusion 8. Confidentiality and time are among the obstacles to such partnerships in the country.

During the course of the research all mentioned aims have been studied and investigated through the presented literature review and the collected data. This research is targeted at exploring the collaboration between academics and industry personnel within the UAE. Qualitative research method was used to explore the current practice of such collaboration, the reasons and motivation factors, and the barriers challenges towards such collaboration in the UAE.

By going through extensive literature about academic-industry collaboration and conducting interviews with regional university faculty, it was obtained that financial benefit and getting familiar with real life issues can be classified as motivators for academia to collaborate with the industry. They explained that industry could be referred to as a source of profits and income for the academic institutions. Besides funding that could be attained from the industry for research projects, some certain funding can be attained from government organizations only through interacting with the industry in the UAE.

In contrast, financial aspect was found as a possible barrier for industry-academic partnerships. Financial benefit is identified as a motivator factor for academics in collaborating with industry; however, it could be seen that in the UAE, companies are not that much willing to spend money on researches. Thus, financial aspect can play the role of an obstacle as well. A part of it is related to the industry culture.

In addition, getting familiar with the real life problems and issues within regional companies is considered as a reason for academic-industry collaboration in the

country. University faculty and students can get familiar with problems that local companies are facing. This would help them to learn more about real life issues and such issues can be used as their research topic.

The responses gotten from interviewees showed that innovative ideas of academia and students can be classified as an important factor for industry to collaborate with universities. Beside innovation, knowledge transfer and knowledge sharing are other key factors that were addressed by respondents. Emiratisation is another encouraging factor which is specific to the UAE. Localizing workforce was addressed by respondents as a motivator. University faculty can attain funding from National Research Foundation (NRF) and Emirates Foundation for their research projects in collaboration with industry by using local students as research assistants. Therefore, it shows that localizing workforce can improve such practice in the UAE.

The findings from research addressed some issues that affect university-industry cooperation within the country. One of the factors that most of the respondents mentioned during the interview is organizational culture and industry's trust on academics in the UAE. Collected data indicated the lack of trust on academics from industry. Companies often prefer to pay money for consultants that are located in other countries like United States and Europe to solve the problems rather than investing in research in partnership with local universities.

Other barriers that were identified from the research are confidentiality of companies' information and time. Companies do not tend to share their information with others, and they prefer to focus on their projects in order to deliver them on time, rather than allocate some time for cooperating with universities. In addition to these factors, another reason that companies in the UAE are not willing to allocate budget for research is that most of them do not develop things in-house. Therefore, it is too rare that they see the reason for investing on research. They often follow other companies and in case if they face any problems, they prefer to pay money for a consultant to solve their problems.

5.2 Recommendation

The following are some of the recommendations reached from the research:

- The research suggests industry personnel and academics to build trust between each other as an important factor for the collaboration. Universities are encouraged to try to provide practical solutions to problems of the companies through research studies. They need to approach companies to present their practical solutions. This would improve the trust and would lead companies to approach universities to solve their problems rather than hiring consultants from other countries.
- Academics can share their research solutions as well as their innovative ideas with local companies. This would help companies to know about the researches conducted in universities and their outcomes. Hence, in case they face similar problems, they might be interested to approach universities for providing solutions to their issues. This would help faculty and students to improve their research programs as well. The new discoveries and patents achieved by researches can be used as sources of financial benefit for universities and industrial organizations. By collaborating with industry, universities can improve the distribution of intellectual property and commercialization of their research findings.
- Local companies are encouraged to give some chances to regional universities in solving their issues rather than hiring consultants from outside. This would cost them less and enhance the cooperation between them and universities.
- Universities are suggested to improve their laboratories facilities to be capable of conducting experiments. Such laboratories would allow researches, especially from technical fields such as engineering, to perform required experiments in the labs. This would help them in achieving new findings. Such findings can be shared with industry, and the industry can develop the findings and utilize them to enhance their performance.

- The research recommends that organizations' decision makers should allocate some time for attaining innovative ideas from academics. This can be done through research partnerships or contacting university faculty to exchange knowledge and sharing the issues they face in their organizations. Local universities usually get updated knowledge and ideas from publications and researches. They would be able to suggest innovative ideas to regional companies in order to enhance their performance.
- Encouraging local students to continue their education in technical fields would encourage companies to hire local students for positions that require technical skills. This would eliminate the lack of local workforce in technical positions in the country and would result in enhancement of Emiratisation, which is a driver of academic-industry collaboration.

Appendices

Appendix A – Interview Questions (Academics)

1. Have you had (or have) any interaction with the industry and organizations?
If yes,
 - Explain briefly how do you interact with them? (provide some examples)
 - What led you to interact with them? What are motivators?
 - How do such relationships transfer knowledge from university to industry/ or from industry to university?
 - How this relationship brings benefit to the university and you personally? Provide some examples.
 - What are the issues/challenges/barriers that you think such relationship may have? (provide some examples)
 - How do you manage your courses/researches in order to be updated according to society and the industry needs?(Provide some examples)
 If no,
 - What prevented you to interact with them?(Provide some examples)
 - What are the issues/challenges/barriers that you think such relationship may have?(Provide some examples)
 - How do you manage your courses/research in order to be updated according to society needs and the industry ?(Provide some examples)
2. What are your expectations from such relationship?
 - What would you like to gain from such relationship?
 - How can it benefit your organization?
3.
 - What do you think about Emiratisation?
 - How do your local students get connected to the industry and organizations and how do they bring benefits to you?(Provide some examples)
 - How Emiratisation leads your organization to interact with the industry and other organizations?(Provide some examples)

Appendix B – Interview Questions (Industry Personnel)

1. Briefly explain the nature of your business.
2. Have your organization had (or does it have) any interaction with academia and universities?

If yes,

- Explain briefly how do you interact with them?
- What leaded you to interact with them?
- What are the issues/challenges/difficulties that you think such relationship may have(Provide some examples)
- How this relationship brings benefit to your organization? (Provide some examples)

If no,

- What prevented you to interact with them? (Give some examples)
- What are the issues/challenges/difficulties that you think such relationship may have(Provide some examples)
- How do you manage your organization in order to keep it up to date/innovated/advanced scientific knowledge(Provide some examples)

3. What are your expectations from such relationship?
 - What would you like to gain from such relationship?
 - How can it benefit your organization?

4. - What do you think about Emiratisation?

Have you done Emiratisation in your organization?

If yes,

- What are the reasons that leaded you to implement Emiratisation?
- What are the benefits you get from it(Provide some examples)
- What are the difficulties/issues of Emiratisation(Provide some examples)

If no,

- What prevented you to do so(Provide some examples)
- How Emiratisation leads your organization to interact with academia?

References

Al-Dosary, A. S., & Rahman, S. M. (2005) Saudization (Localization) –A Critical Review. *Human Resource Development International*, vol. 8(4), pp. 459-502.

Al-Harbi, K. M. A-S. (1997). Markov analysis of Saudization in engineering companies. *Journal of Management in Engineering*, vol. 13(2), pp. 87-91.

Allan, M. (2001). A review of best practices in university technology licensing offices. *The Journal of the Association of University Technology Managers*, vol.8, pp. 57-69.

Alvesson, M. (2002). *Understanding organizational culture*. London: Sage 2002.

Arvanitis, S., & Kubli, U., & Woerter, M. (2008). University-industry knowledge and technology transfer in Switzerland: What university scientists think about co-operation with private enterprises. *Research Policy*, vol. 37, pp. 1865-1883.

Audrestch, D. B., & Stephan, P. E. (1996). Company scientist locational links: the case of biotechnology. *American Economic Review*, Vol. 86(3), pp. 641-652.

Baba, M. L. (1988). Innovation in university–industry linkages: University organizations and environmental change. *Human Organization*, vol. 47(3), pp. 260-269.

Barriball, K. L., & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing*, Vol. 19, pp. 328-335.

Beath, J., & Owen, R.F., & Poyago-Theotoky, J., & Ulph, D. (2003). Optimal incentives for income-generation in universities: the rule of thumb for the Compton tax. *International Journal of Industrial Organization*, vol. 21, pp. 1301-1322.

Bercovitz, J. E. L., & Feldman, M. P. (2007). Fishing upstream: Firm innovation strategy and university research alliances. *Research Policy*, vol. 36(7), pp. 930-948.

Bercovitz, J., Feldman, M., Feller I. & Burton, R. (2001). Organizational structure as a determinant of academic patent and licensing behavior: An exploratory study of Duke, Johns Hopkins, and Pennsylvania state universities. *Journal of Technology Transfer*, vol. 26, pp. 21-35.

Blaug, S., & Chein, C., & Shuster, M. J. (2004) Managing innovation: university-industry partnerships and the licensing of the Harvard mouse. *Nature Biotechnology*, vol. 22(6), pp. 761-763.

Blumenthal, D., & Campbell, E. G. (2000). *Academic-industry relationships in biotechnology overview*. New York: John Wiley & Sons.

Bradshaw, T. J., and Blakely, E. J. (1999) What are “third-wave” state economic development efforts? From incentives to industrial policy. *Economic Development Quarterly*, vol. 13, pp. 229-244.

Branscomb, L. M., Kodma, F. (1999). *University Research as an Engine for Growth: How Realistic Is the Vision*. Cambridge Mass.: MIT Press.

Brimble, P., & Doner, R. F. (2007) University–Industry Linkages and Economic Development: The Case of Thailand. *World Development*, vol. 35(6) pp. 1021-1036.

Cain, A. (2002) Archimedes, Reading, and the Sustenance of Academic Research Culture in Library Instruction. *The Journal of Academic Librarianship*, vol. 28(3), pp. 115-121.

Cambpell, T. & Slaughter, S. (1999). Faculty and administrators’ attitudes toward potential conflicts of interest, commitment, and equity in university-industry relationships. *Journal of Higher Education*, Vol. 70(3), pp. 309-352.

Campbell, T. I. D. (1997). Public policy for the 21st century: Addressing potential conflicts in university-industry collaboration. *The Review of Higher Education*, Vol. 20(4), pp. 357-379.

Campbell, E. G., & Joshua, P., & Blumenthal, D., & Brian, B. (2004) Inside the triple helix: technology transfer and commercialization in the life sciences. *Health affairs*, vol. 23(1), pp. 64-76.

Carlsson, B., & Fridh, A.-C. (2002). Technology transfer in United States Universities. *Journal of Evolutionary Economics*, vol. 12, pp. 199-232.

Cheung, S. O., & Wong, P. S. P., & Wu, A. W. Y. (2011) Towards an organizational culture framework in construction. *Towards an organizational culture framework in construction*, vol. 29, pp. 33-44.

Cockrell, R. C., & Stone, D. N. (2010) Industry culture influences pseudo-knowledge sharing: a multiple mediation analysis. *Journal of Knowledge Management*, vol. 14(6), pp. 841-857.

Cohen, W. M., & Nelson, R. R., & Walsh, J. P. (2002) Links and impacts: the influence of public research on industrial R&D. *Management Science*, vol. 48, pp. 1-23.

Cohen, W. M., Nelson, R. R., & Walsh, J. P. (2002). Links and impacts: the influence of public research on industrial R&D. *Management Science*, vol. 48(1), pp. 1-23.

Creswell, John. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. California: SAGE Publications.

Cross, R., & Parker, A., Laurence, P., & Stephen, P. B. (2001). Knowing what we know: Supporting knowledge creation and sharing in social networks. *Organizational Dynamic*, vol. 30(2), pp. 100-120.

Cross, R., & Parker, A., Laurence, P., & Stephen, P. B. (2001). Knowing what we know: Supporting knowledge creation and sharing in social networks. *Organizational Dynamic*, vol. 30(2), pp. 100-120.

Davenport, T. H., & Prusak, L. (2000). *Working knowledge: How organizations manage what they know*. Boston: Harvard Business School Press.

Dorf, R. C., & Worthington, K. K. F. (2005). Technology transfer from universities and research laboratories. *Technological Forecasting and Social Change*, vol. 37(3), pp.251-266.

Doring, T., & Schnellenbach, J. (2006) What do we know about geographical knowledge spillovers and regional growth? A survey of the literature. *Regional Studies*, vol. 40, pp. 375-395.

Dosi, G. (1982). Technological paradigms and technological trajectories. *Research Policy*, vol. 11, pp. 147-162.

Duderstadt, J, J., & Womak, F. W. (2005). The future of the public university in America: Beyond the crossroads. *The review of higher education*, Vol . 28(3), pp. 452-453.

Eldon, J. (1993). The origin of federal support for higher education: George W. Atherton and the land-grant college movement. *The Journal of Higher Education*, Vol. 64(5), pp. 602-604.

Etzkowitz, H. (2003) Innovation in Innovation: The Triple Helix of University-Industry-Government Relations. *Social Science Information Sur Les Sciences Sociales*, vol. 42(3), pp. 293-337.

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: Form national systems and ‘mode 2’ to a triple helix of university-industry-government relations. *Research policy*, Vol. 29(2), pp. 109-123.

- Fairweather, J. S. (1989). Academic research and instruction: The industrial connection. *Journal of Higher Education*, vol. 60(4), pp. 388-407.
- Feldman, M. P., & Florida R. (1994) The Geographic Sources of Innovation: Technological Infrastructure and Product Innovation in the United States. *Annals of the Association of American Geographers*. Vol.84(2), pp. 210-229.
- Feldman, M., Feller, I., Bercovitz, J., & Burton, R. (2002). Equity and the technology transfer strategies of American research universities. *Management Science*, vol. 48(1), pp. 105-121.
- Fiaz, M., & Naiding, Y. (2012). Exploring the barriers to R&D collaborations: A challenge for industry and faculty and faculty for sustainable U-I collaboration growth. *International Journal of u- and e- Service, Science and Technology*, vol. 5(2), pp. 1-16.
- Forstenlechner, I. (2010) Workforce localization in emerging Gulf economies: the need to fine-tune HRM. *Emerald Group Publishing Limited*, vol. 39(1), pp. 135-152.
- Geiger, R. (1989). The ambiguous link: Private industry and university research. *The Economics of American Higher Education*, pp. 265-297.
- Geiger, R. L., & Creso, S. (2005) Beyond Technology Transfer: US State Policies to Harness University Research for Economic Development. *Minerva: A Review of Science, Learning and Policy*, vol.43(1), pp. 1-21.
- Grant, H. (2010). Australian university research commercialization: perceptions of technology transfer specialists and science and technology academics. *Journal of higher education policy and management*, vol. 32(1), pp. 69-83.
- Gulbrandsen, M., & Smeby, J.-K. (2005). Industry funding and university professors' research performance. *Research Policy*, vol. 34(6), pp. 932-950.
- Gupta, A., & Govindarajan, V. (2000). Knowledge flows within multinational Corporations *Strategic Management Journal*, vol. 21(4), pp. 473-496.

Haksson, A.G. (1998). *The commercialization of university research discoveries: Are university technology transfer offices stimulating the process?* Ph.D. Thesis, Massachusetts Institute of Technology.

Hall, B. H., Link, A. N., & Scott, J. T. (2003). Universities as research partners. *Review of Economics & Statistics*, vol. 85(2), pp. 480-486.

Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly*, vol. 44(1), pp. 82-111.

Hatakenaka, S. (2004). *University-industry partnerships in MI, Cambridge, and Tokyo*. New York: Routledge Flamer.

Hellmann, T. (2007). The role of patents for bridging the science to market gap. *Journal of Economic Behavior and Organization*, vol. 63(4), pp. 624-647.

Hong, L., & Yunzhong, J. (2001). Technology transfer from higher education institutions to industry in China: nature and implications. *Technovation*, vol. 21(3), pp. 175-188.

Hutt, P.B. (1983), University/corporate research agreements. *Technology in Society*, vol. (5), pp.107-118.

Jensen, R., Thursby, M. (2004). *The Academic Effects of Patentable Research*. Cambridge: Cambridge Mass.

Kaufmann, A. and Todtling, F. (2001) Science-industry interaction in the process of innovation:the importance of boundary crossing between systems. *Research Policy*, Vol. 30(5), pp. 791-804.

Killeron, R. (1989) Institutional conflict of interest. *Research Management Review*, vol. 3(2), pp. 1-12.

Kotnour, T., Buckingham, G., & Wolf, M. F. (2001). Universities partnership help aerospace firms. *Research Technology Management*, vol. 44(3), pp. 5-7.

Lee, Y. S. (1996). Technology transfer and the research university: A research for the boundaries of university-industry collaboration. *Research policy*, vol. 25, pp. 843-863.

Link, A. N., & Scott, J. T. (2005) Universities as partners in U.S. research joint ventures. *Research Policy*, vol. 34, pp. 385-393.

Link, N. A. & Tasse, G. (1989). *Cooperative Research and Development: The Industry - University - Government Relationship*. Boston: Kluwer.

Louis, K. S., Jones, L.M., Anderson, M. S., Blumental, D., & Campbell, E. G. (2001). *Journal of Technology Transfer*, vol. 26(3), pp. 233-245.

Malecki, E. & Bradbury, S. (1992) R&D facilities and professional labour: labour force dynamics in high technology. *Regional Studies* vol.26 pp.123-136.

Mansfield, E. (1991) Academic research and industrial innovation. *Research Policy*, vol.20 (1) pp.1-12.

Marshall, E. (1990). When commerce and academe collide. *Science*, vol. 248(4952), p. 152.

Matkins, G. W. (1990). *Technology transfer and the university*. New York: Macmillan Publishing Company.

McDowell, G. R. (2003). Engaged universities: lessons from land-grant universities and extension. *Annals of the American Academy of Political and Social Science*, vol. 58(1), pp. 31-50.

Mohamed, A. (2002). Assessing determinants of departmental innovation: An exploratory multi level approach. *Personnel Review*, vol. 31(5), pp. 620–641.

Mowery, D. C., & Sampat, B. (2005). The Bayh-Dole Act of 1980 and university-industry technology transfer: A model for the other OECD governments?. *Journal of Technology Transfer*, vol. 31(1), pp.115-127.

Muir, A. (1990). Managing inventions marketing. *Journal of Licensing Executives Society*, vol.4(4) ,pp. 79-80.

Newfield, C. (2004). The state of university-industry relations. *Social text*, vol. 79(22), pp.37-66.

Nimtz, L. (1996). Knowing what we know: University-Industry Partnerships: Meeting the Challenge with a High-Tech Partner. *SRA Journal*, vol. 27(2), pp. 9-17.

Palmintera, D. (2005). *Accelerating Economic Development through University Technology Transfer*. [online]. [Accessed 2 December 2012]. Available at: http://www.innovationassoc.com/docs/CT_NatRpt.pdf

Patton, M. (2002). *Qualitative research and evaluation methos*. Thousand Oaks: CA Sage.

Peters, L. S., & Herbert I. F. (1982). *University-Industry Research Relationships*. National Science Foundation.

Ponds, R., & Oort, F. V., & Frenken, K. (2010) Innovation, spillovers and university–industry collaboration: an extended knowledge production function approach *Journal of Economic Geography*, vol. 10, pp. 231-255.

Povoa, L. M. C. (2010). Technology transfer from universities and public research institutes to firms in Brazil: what is transferred and how the transfer is carried out. *Science and public policy*, vol. 37(2), pp. 147-159.

Power, D., & Malmberg, A. (2008) The contribution of universities to innovation and economic development: in what sense a regional problem? *Journal of Regions, Economy and Society*, vol. 21, pp. 223-245.

Poyago-Theotoky, J., & Beath, J., & Siegel, D. (2002) Universities and fundamental research: Reflections on the growth of university-industry partnerships. *Oxford Review of Economic Policy*, vol. 18(1), pp. 10-21.

Premus, R. (1982) R. *Location of high technology firms and regional economic development*. Washington, DC: US Government Printing Office.

Rees, C. J., & Mamman, A., & Barik, A. B., (2007) Emiratization as a strategic HRM change initiative: case study evidence from a UAE petroleum company. *International Journal of Human Resource Management*, vol. 18(1), pp. 33-53.

Roberts, J. (2000). From know-how to show-how? Questioning the role of information and communication technologies in knowledge transfer. *Technology Analysis & Strategic Management*, vol. 12(4), pp. 429-443.

Romer, P. (1990) Endogenous Technological Change. *The Journal of Political Economy*, vol. 98(5), pp. 71-102.

- Rosenburg, N., & Nelson, R. R. (1994). America universities and technical advance in industry. *Research policy*, vol. 23, pp. 323-348.
- Santoro, M. D., & Chakrabarti, A. K. (2001). Corporate strategic objectives for establishing relationships with university research centers. *IEEE Transactions on Engineering Management*, vol. 48(2), pp. 157-163
- Saunders, M. , Lewis, P. , Thornhill, A. (2007). *Research Methods for Business Students*. (4th Ed), Prentice Hall.
- Schartinger, D., & Schibany, A., & Gassler, H. (2001). Interactive relations between universities and firms:empirical evidence for Austria. *Journal of Technology Transfer*, vol. 26, pp. 255-268.
- Shariq, S. Z. (1999) Inside the triple helix: How does knowledge transform as it is transferred? Speculations on the possibility of a cognitive theory of knowledge escapes. *Journal of Knowledge Management*, vol. 3(4), pp. 243-251.
- Simmie, J. (2003) Innovation and Urban Regions as National and International Nodes for the Transfer and Sharing of Knowledge. *Regional Studies* vol. 37(6),pp. 607-620.
- Smith, B.L. R. (1990). *American science policy since world war II*. Washington DC: The Brookings Institution.
- Sparks, J. (1985) The creative connection: University-industry relations. *Research Management*, vol. 1, pp. 19-21.
- Stuart, T. (2000) Interorganisational alliances and the performance of firms:A study of growth and innovation rates in a high-technology industry. *Administrative Science Quarterly*, vol. 43, pp. 668-698.

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, vol. 17, pp. 27-44.

Thomsen, P. (1997). *The relationship between work experience during college and subsequent employment in high-technology firms*. Ph.D. Dissertation, University of California.

Thune, T. (2009). Proximity and interactive learning in university–firm relationships. *Industry and Higher education*, vol. 23(1), pp. 1-10.

Toshihiro, K. (2008). The role of intermediation and absorptive capacity in facilitating university–industry linkages—An empirical study of TAMA in Japan. *Research policy*, vol.37(8), pp. 1224-1240.

United Arab Emirates National Bureau of Statistics (UAE NBS). (2013) [online]. [Accessed 4 January 2013]. Available at: <http://www.uaestatistics.gov.ae/EnglishHome/tabid/96/Default.aspx>

Varga, A. (1997). *Regional Economic Effects of University Research: A Survey*. Survey, Morgantown, WV: Regional Research Institute.

Viale, R., & Etzkowitz, H. (2010). *The Capitalization of Knowledge A Triple Helix of University–Industry–Government*. Cheltenham UK: Edward Elgar Publishing Limited.

Vinding, A. L. (2004). Interaction between firms and knowledge institutions. *Management and Policy*, vol. 8, pp. 257-283.

Walliman, N. S. R. (2011). *Research methods: Basics*. United Kingdom: Taylor & Francis Ltd.

Walliman, N. W. (2011). *Research Methods: The Basics*. New York: Routledge.

Washburn (2005). *The corporate corruption of higher education*. New York: Basics Books.

Waters, C. E., Alvine, S., Eble-Hankins, M. (2012). Industry-Experienced Graduate Student Program: Innovative Collaboration in Architectural Engineering at the University of Nebraska, Lincoln. *Journal of architectural engineering*, vol. 18(1), pp. 61-63.

Williams, F., Gibson, D. (1990). *Technology transfer, a communication perspective*. Newbury Park, CA: Sage Publications.

Witte, K. D., & Muijen, J. J. V. (1999) Organizational Culture. *European Journal of Work and Organizational Psychology*, vol. 8(4), pp. 497-502.

Wright, P. (1990). *Industry and higher education: collaboration to improve students' learning and training*. Buckingham: Open University Press.