

University-Industry/Business Interaction: KFUPM Experience

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Abstract

Interaction between the University and both the Industry and Business is of paramount importance in enhancing learning, research, and the mutual relationship with the society. This interaction needs to occur across the broad spectrum of industries and businesses and should not be restricted to major industry sectors. Venues of interaction and cooperation between an academic institution and business and industry can take a variety of forms, which may relate to students, faculty, or the administration. Currently at King Fahd University of Petroleum and Minerals (KFUPM), this interaction is practiced in an unstructured manner and mostly as a result of initiatives and efforts from individuals in a few departments. This paper reports the preliminary results of a study to evaluate and improve the dynamics of industry/business interaction at KFUPM.

1. Introduction

Historically, the task for universities has been to conduct research and to educate new academics. The understanding of university education has been purely to provide a minority of young people with a research-based understanding of life. As one of the key factors on the knowledge based economy, universities must learn to play other roles than those of the “classical” universities. Universities must reach out and be more involved in the society and more integrated strategically on local, national and international levels. In addition, universities must play an active role in maintenance of the knowledge-based workforce.

University-industry collaborations can result in benefits to both parties. While the university research centers have access to intellectual resources and world-class basic

research infrastructure, industrial firms usually have practical experience, financial resources, and internship opportunities for students and employment opportunities for graduates and students. Successful collaborations between industry and academia are beneficial to all involved. For the researcher, there is an opportunity to engage in real world problems and diversify both the research and funding of research. On the other hand, contracting out research enables companies to reduce their infrastructure costs and concentrate on their core business. In many cases, the specialized expertise required to solve a problem does not exist in the company, and analytical equipment not readily available. Universities are a source of both.

In the US and other developed nations, hundreds of universities and tens of thousands of faculty members are/were engaged in research and technology development with industry [1-12]. This interaction has developed incrementally over the years and the factors that affect it include the firms, the faculty, universities and the government as well as the individuals. However, the interactions between these components yield a system that is highly dynamic. This relationship has gained considerable more attention in the recent years realizing that these ties are highly beneficial especially after it became apparent to researchers on both sides that this relationship is yielding significant pay-offs to the nation, to the firms and to the academia.

In developing countries, the interaction between academia and industry has not been so successful. According to Alwan and Cheikh-Obeid [13], such collaboration is hindered by problems at both the local industry and the local higher education and research establishments. The local industry may be under license, operated by under-trained labor and protected by governmental laws that prohibit the import of competitive products. Thus, there will be no encouragement for continuous research and development. Problems with local universities include: limited applied research capability and industrial experience of faculty members, low graduate students enrollment, inadequate research budgets, and rigid regulations that limit interaction with industry. In spite of these difficulties, there is a growing interest in enhancing the university-industry collaboration in our region [13-16].

This paper reports the preliminary findings of an on-going project at King Fahd University of petroleum and Minerals (KFUPM) at Dhahran, Saudi Arabia, which

aims to evaluate and enhance the cooperation between KFUPM and local business and industry. Subsequent sections are organized as follows. Section 2 describes the KFUPM project to evaluate and enhance interaction with business and industry. Section 3 reports the input of different KFUPM academic departments and categorizes their existing venues of interaction with industry. Section 4 highlights the input and recommendations of industry representatives. Finally, section 5 includes some suggestions and conclusions.

2. KFUPM-Industry/Business Interaction Project

With all industries and businesses increasingly dependent on human resources in a knowledge-based economy, they will need to increasingly rely on universities which remain world class and diverse. KFUPM and industry/business will need to cultivate mutually beneficial and lasting relationships with one another. Thus, KFUPM found it imperative that a framework for a successful collaboration with business/industry in the Kingdom of Saudi Arabia has to be fostered. Consequently, the Deanship of Academic Development at KFUPM has initiated a project titled “A Framework for KFUPM-Industry/Business Interaction” to investigate the ways and means that enhance the collaboration between KFUPM and companies. The project’s team members are the authors of this paper. The duration of the project is 10 months, from September 2004 to June 2005, thus it is still continuing, and the results are not yet completed.

This research project is intended to assist the KFUPM faculty to identify the better opportunities for, and manage collaborations with industry. Thus, the available tools and information to support collaborative research, to develop a strategic approach to collaboration, and to produce a framework for researchers and business will be established. A framework/guidelines would be designed primarily to assist faculty in their relations with industry. The framework summarizes relevant University policies and seeks clarification of relationships and obligations between KFUPM and private industry.

2.1. Objectives

The overall objective of this reported study is to contribute to a better understanding of the dynamics of university–industry interactions and to develop a framework and specific tools for KFUPM – industry/business interaction. The specific objectives include:

1. Review of the nature and extent of current KFUPM-industry/business interactions including identifying current problems and barriers.
2. Review the literature on best practice models and successful experiences worldwide.
3. Investigating processes/policies needed for effective cooperation and interaction.
4. Investigating the overall role and effects of interaction on academic outcomes.
5. Development of a structured practical and beneficial framework for KFUPM-industry/business interaction.
6. Identifying processes and channels that are required to execute and sustain each venue of interaction.

2.2. Methodology

The above objectives of this study are achieved by carrying out the following tasks:

1. Literature review to explore the university/industry practices worldwide using Internet and library search and e-mail correspondence.
2. Data collection from KFUPM departments on existing venues of interaction with industry using a short survey.
3. Data collection from local businesses and industry on their views and objectives towards enhanced interaction with KFUPM, using questionnaires, site visits, and interviews with administrators and employees.
4. Soliciting views from all faculty members on improving the interaction with local business and industry, using questionnaires and interviews.

5. Conducting discussion forums for KFUPM administrators and faculty members and businessmen and administrators from industry on the ways and means that help in building a long lasting relationship between KFUPM and industry.
6. Data analysis, developing recommendations, reporting, and documentation.

As the project is still progressing, some of the above tasks are not fully completed. So far, the project team has completed tasks 1, 2, and (partly) 5. Task 1 (literature review) is included in Section 1 of this report, while tasks 2 (departmental survey) and 5 (workshops) will be respectively discussed in the two following sections.

3. Departmental Survey

Venues of interaction and cooperation between an academic institution and business and industry can take a variety of forms, which may relate to students, faculty, or the administration. These interactions can take a large number of different forms, varying according to the extent of their formality and complexity. These forms include the 30 venues classified into 3 types shown in Table 1.

Table 1. Classified venues of university-industry interaction

#	Students	Faculty	Industry/Administration
1	Coop Training	Summer Employment	Industrial Advisory Committees
2	Summer Training	Sabbatical Leaves	Endowed Chairs
3	Senior Projects	Consultation	Industrial Parks
4	Scholarships	Funded Research	Business Ventures & Incubators
5	Sponsored Labs	Training and Short Courses	Technical Exchange Meetings
6	Sponsored Courses	Sponsored Courses	Sponsored Events
7	Employment	Professional Society's Membership	Financial Support
8	Student Development	Faculty Development	Professional Societies
9	Industrial Visits	Industrial Visits	Curricula Development
10	Lectures/Seminars	Lectures/Seminars	Memos of Understanding

In order to collect data on existing venues of interaction with business and industry across all departments at KFUPM, a short survey was sent to all 19 academic departments in addition to the Research Institute (RI). Replies to this survey were received from 17 academic departments in addition to the RI (a 90% response rate).

The survey contained three following questions:

1. From the list (shown in Table 1), please tick the venues of interaction with industry currently activated, practiced, or applicable to your department.
2. Please list any other interaction venues that currently exist between your department and the industry, which is not, listed in question 1.
3. Please list any other venues that you would like to recommend, which are not listed in questions 1 and 2.

3.1. Existing Venues of Interaction

The replies to question 1 are summarized in Tables 2-5. Replies classified into students, faculty members, and administration categories are summarized in Tables 2, 3, and 4, respectively. From these tables, it is clear that faculty-related group of interaction venues has the highest total frequency (123 out of 180), followed by faculty-related interaction venues (83/180), and finally administration-related interaction venues (71/180). In terms of single venues, faculty-related activities also top the list, with highest frequency for consulting (17/18), followed by professional society membership (16/18).

Table 2. Existing student-related interaction venues between KFUPM Depts.& Industry

Dept. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Sum
Coop Training	1			1	1		1	1	1	1	1			1	1	1			11
Summer Training	1	1	1	1	1	1	1	1	1	1			1	1		1	1	1	15
Capstone Senior Projects	1				1		1						1						4
Scholarships	1					1	1	1					1				1		6
Sponsored Labs	1							1									1		3
Sponsored Courses											1		1		1		1		4
Employment	1		1	1	1	1	1						1				1		8
Student Development				1									1				1		3
Industrial visits	1	1	1	1	1	1	1	1	1	1		1	1			1	1	1	15
Lectures/Seminars	1		1	1	1			1	1	1	1	1	1		1	1	1	1	14
Sum	8	2	4	6	6	4	6	6	4	4	3	2	8	2	3	4	8	3	83

Table 3. Existing faculty-related interaction venues between KFUPM Depts. & industry

Dept. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Sum
Summer Employment	1		1	1	1			1	1		1	1	1	1		1	1		12
Sabbatical Leaves	1			1				1	1	1	1	1	1	1	1		1		11
Consultation	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
Funded Research	1		1	1			1	1	1	1	1	1	1	1			1	1	13
Training and Short Courses	1		1	1	1	1	1	1	1	1		1	1	1		1	1	1	15
Sponsored Courses	1										1		1						3
Professional Society Membership	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	16
Faculty Development			1	1	1				1	1			1				1		7
Industrial Visits	1	1	1	1	1	1	1	1	1	1			1	1		1	1	1	15
Lectures/Seminars	1		1	1	1	1	1	1	1	1		1	1			1	1	1	14
Sum	9	1	8	9	7	5	6	8	9	8	5	7	10	7	3	6	9	6	123

Table 4. Existing administration-related KFUPM Depts.-industry interaction venues

Dept. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Sum
Industrial Advisory Committees	1		1	1	1	1	1	1	1	1	1	1		1		1	1	1	15
Endowed Chairs	1		1	1	1										1				5
Industrial Parks										1							1	1	3
Business Ventures/Incubators																			0
Technical Exchange Meetings	1			1	1		1	1	1	1			1					1	9
Sponsored Events	1		1	1	1	1		1					1	1		1		1	10
Financial Support							1	1		1					1	1			5
Professional Societies	1		1	1	1	1			1				1	1				1	9
Curricula Development	1			1	1	1	1	1		1		1	1	1		1	1		12
Memos of Understanding							1										1	1	3
Sum	6	0	4	6	6	4	5	5	3	5	1	2	4	4	2	4	4	6	71

Table 5 shows that the total frequency of existing interaction venues with industry for each KFUPM department has a high variation, as it ranges from 3 to 23 (out of 30). The overall average frequency of existing venues with industry for KFUPM is 277 out of 540 (30 venues \times 18 departments), or 51.3%. Clearly, this average is not satisfactory, and there is a lot of room for improvement.

Table 5. Total frequency of existing KFUPM Depts.-industry interaction venues

Department number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	20	Sum
Department total	23	3	16	21	19	13	17	19	16	17	9	11	22	13	8	14	21	15	277

3.2. Other Existing Interaction Venues

Replies to question 2 are listed below.

1. Faculty member owns shares (founding member) of an incubator company
2. Workshops/seminars/symposia/conferences/exhibitions (local and international)

3.3. Recommended Interaction Venues

Replies to Question 3 are listed below.

1. Companies sponsor part-time graduate students as employees (easier to get visas).
2. Deanship of Academic Development hosts faculty and industry teams.
3. Partnership with consulting offices and houses of expertise.
4. International cooperation with GGC and international companies.
5. Professionals sent to KFUPM Departments for higher education on industry-sponsored scholarships.
6. Educational advising of industry professionals in other universities.
7. Give industry professionals (through adjunct professorship) opportunities to teach courses and supervise theses at KFUPM.
8. Expand industrial visits.
9. Expand opportunities for faculty summer employment.

4. Discussion Forum

The University-Industry Interaction project's team, in collaboration with the KFUPM Deanship of Academic Development, organized a Discussion Forum on KFUPM-Industry/Business Interaction [15]. The one-day Forum was held at KFUPM on January 4th, 2005. 88 KFUPM faculty members and 48 representatives attended the forum from a wide range of industries and business in Saudi Arabia. The program

included short presentations by 7 invited speakers (3 from KFUPM and 4 from industry), followed by an open discussion period. Some of the many useful and important and useful comments and suggestions made during the presentations and the discussion period are summarized below.

4.1. Suggestions from the Presentations

The four speakers from the industry presented the experiences and perspectives of four major corporations, namely SABIC, Saudi Aramco, Saudi Electricity Company, and Advanced Electronics Company. The topics of the three presentations made by KFUPM speakers were: KFUPM-industry/business interaction project, contract research, and faculty work experience in industry. Comments collected from the presentations include:

1. The University/industry should be a win-win relationship.
2. Proper marketing for KFUPM research is needed.
3. Hands-on training must be injected in KFUPM academic programs to students and in short courses to participants from industry.
4. Coop and summer training programs need to be improved.
5. A national innovation system should be developed where the government plays a role in bringing both parties (university and industry) together.
6. Provide more opportunities and incentives for faculty members' work in industry.
7. Communication must be improved to eliminate the misperception between universities (academia) and industry.
8. Consultation and applied case studies should be counted by the university in the promotion of faculty members.

4.2. Suggestions from the Discussion Period

After the presentations, a moderated open discussion was held on the mechanisms and barriers in four venues of interaction: (1) Student training and employment, (2) Contract research and consultation, (3) Faculty/professionals interaction, and (4) Support and funding. During the open discussion period, suggestions made by KFUPM faculty members and industry representatives include the following:

1. Establish a KFUPM Industrial Liaison Unit to work on coordination with industry on a full-time basis and to serve as a single point of contact for companies seeking cooperation with KFUPM.
2. Hold monthly meetings between KFUPM and industry.
3. Form an industrial council of KFUPM alumni in key positions in industry.
4. Involve industry in the University-Industry Interaction (UII) project, or include industry representatives in the UII team.
5. Organize another meeting/workshop, possibly with different format, before May 2005.
7. Change the existing lengthy and bureaucratic interaction processes at KFUPM that actually discourage rather than facilitate collaboration.
8. A framework that maintains strong and sustained relationship between the two parties should be developed. The industry/business party should share in structuring this framework
9. Benchmark with and learn from worldwide experiences and international best practices in the area of university/industry relationship.

5. Conclusions

This paper presented the initial results of an-going project at KFUPM to assess and enhance the interaction with industry. The main objective of the study is to develop a framework for a strong and lasting institutionalized collaboration with regional business and industry. More specifically, this means proposing the processes and channels that are required to build and sustain this interaction. The methodology required to accomplish these objectives consists of several tasks that include literature review, data collection from KFUPM departments and faculty members as well as businesses and industry, and organizing discussion forums. This paper presented the results of the tasks thus far completed, namely literature review, departmental survey, and discussion forum.

The results of the departmental survey showed that the average utilization of existing venues is equal to 51%. Although there are large variations among the interaction levels of different department, this average means that KFUPM departments are generally not very active in interaction with industry. Many useful comments and suggestions were received from both the departmental survey and the discussion forum. These suggestions point to the following: (i) an overall dissatisfaction with existing state of interaction between KFUPM and industry, (ii) the need to establish a full-time office for handling the interaction with industry on a full-time basis, and (iii) the necessity of involving industry in developing the university-industry interaction framework. These results will be refined and consolidated with new data that will be collected until the project is completed.

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