

Knowledge Exchange Relationship between Research Institutions and Businesses in Kuwait

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ملخص

تبادل المعلومات بين المؤسسات البحثية والتجارية في الكويت

يستولى موضوع تبادل المعلومات بين مراكز البحوث والمؤسسات والمشاريع التجارية على اهتمام واسع في المجتمعات الحديثة لما توفره نتائج البحوث من معلومات تساعد في تطوير الخدمات والمنتجات.

لذلك يقدم الباحث - بصورة موجزة - تحليلاً للمعلومات التي جمعت بواسطة مسح شمل أكثر من ٥٥٠ شركة ومؤسسة تجارية في الكويت، حيث يكشف أنواع العلاقات المشتركة بين مراكز البحوث والمؤسسات التجارية والعواقب التي تواجهها حالياً.

تواجه مراكز البحوث ضغطاً متزايداً من قبل المجتمع من أجل استعراض وتحليل متطلباته لذلك يتحتم على هذه المراكز أن تقوم بدورها خصوصاً مع ازدياد نشاط القطاع الصناعي في الكويت في العقود الثلاثة الأخيرة عن طريق استيراد وسائل التكنولوجيا الحديثة، الأمر الذي يجعل من تبادل المعلومات مسألة حيوية بين القطاعين البحثي والصناعي من أجل نمو هذا المجال.

كما أن تبادل المعلومات بين قطاعي البحث والتجارة يعد أحد المصادر الرئيسية لانتقال المعلومات التكنولوجية من مراكز البحوث إلى المؤسسات التجارية والصناعية. فمن المعروف أن مراكز البحوث تلعب دوراً حاسماً في تعزيز وتطوير التحديث التكنولوجي في التجارة والصناعة والمشاريع المختلفة. وتتم هذه العملية عن طريق تعليم وتدريب المهندسين والعلماء. وقد وضحت معالم هذه العملية بصورة كبيرة في السنوات الأخيرة عن طريق اهتمام الحكومات ومراكز البحوث والمؤسسات التجارية بتقوية صلاتها للقيام بعمليات تجريبية في القطاع الصناعي مما أعطى هذه العلاقة صبغة المباشرة.

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1- Introduction

The growing societal pressure on Research Institutions to demonstrate their relevance to the needs of society, forces them to be responsive to this increasing demands. Industrial sectors in Kuwait, imported the majority of their technologies during the last three decades. Then there is enough room for development and upgrading of existing technologies, which, Research Institution -Business Knowledge Exchange relationships can play an important role in this matter.

2 - Knowledge Exchange Relationships between Research Institutions and Businesses

Knowledge Exchange between Research Institutions and Businesses as one of the main source of acquisition of technological resource of firms is a major issue in technology-relevant literature. It is considered as a process by which the technology is transferred from research institutes into firms. It is widely recognised that Research Institutions play a crucial role in promoting technological innovation in Businesses. Traditionally there is indirect knowledge transfer between Research Institutions and Businesses through the process of education, by advancing the frontiers of science, critically reviewing technical knowledge and especially through the training (Sweeney 1985). Through the involvement of Research Institutions, scientists and engineers directly in the process of business innovation, creativity can be developed. The emphasis on such direct links was intensified in recent years. Governments, Research Institutions and Businesses in most countries have engaged in a wide spectrum of organisational experiments aiming at strengthening the links between the Research Institutions and industrial environment. The common type of direct Research Institution-Business links are summarised as; participation of Research Institutions scientists and

engineers in technology development activities; consultancy by Research Institutions scientists and engineers; industrially sponsored R&D in Research Institution departments; Research Institution-Business consortia; Research Institution-Business cooperative research centres; science parks; innovation centres and Knowledge Exchange groups. Mutual collaboration may benefit both sides through; providing companies with informal access to Research Institution employing students in collaborative research as a part of their training and consulting which increases the application of Research Institutions knowledge. Further, companies can send their own experts to Research Institutions to acquire new techniques. These kinds of collaborations also make research's focus around industrially relevant concerns.

3- Data and Research Methodology

In this section the research concentrates on the research methodology in terms of population and the sample selection and data collection as well on the formulation of the theoretical model to be used. As a part of a detailed research on technological innovation, Knowledge Exchange relationships between Research Institution and Business was considered as the third channel of acquisition of technological resource by the firms. It was designed to collect data and gain Knowledge through a triangulation including the literature review, the survey methods (questionnaire and interviews) and the analytical techniques. 135 replied questionnaires were analysable and were processed descriptively and statistically. Besides the main questionnaire, supplementary interviews were conducted with executives from different Businesses. In addition twelve structured interviews were conducted with Businesses and Research Institutions officials and professionals. These helped the researcher to gain specific knowledge about the research subject. This paper just reveals the descriptive analysis of the

results regarding relationships between Research Institutions and Businesses.

4 - Descriptive Analysis of Data Collected

The main focus of this study was on the surveyed firms' views on mutual relationships with Research Institutions, however, we gathered the Research Institutions views as well. In the related questionnaire survey, several questions were allocated to the Knowledge Exchange relationship and its features. In addition there were 27 interviews with the firms under study. Moreover, 9 officials and professionals from Research Institutions were interviewed. Some of the results are shown in the following tables:

Table (1) summarises the details of the administered questionnaires in 6 Businesses.

Table (1)
Distribution of Questionnaires to the Businesses

Business Sector	Number of Questionnaire Distributed	%
1-Services Businesses	52	11.55
2- Electrical Businesses	90	08.89
3- Chemical Businesses	92	20.44
4- Textile and cloth Businesses	94	20.89
5- Food Businesses	69	15.33
6- Petrochemical Businesses	153	22.89
Total	550	100

The count and percentage of responses are given in Table (2).

Table (2)
The Statistics of Completed Questionnaires by Business

Business Sector	Number of Responses		
	Count	%	Response (%)
Services Businesses	21	15.6	40.40
Electrical Businesses	15	11.1	37.50
Chemical Businesses	29	21.5	31.52
Textile and cloth Businesses	23	17.0	24.46
Food Businesses	24	17.8	34.78
Petrochemical Businesses	23	17.0	22.30
Total	135	100	-----

Table (2) illustrates the large disparity in the sectoral responses.

The extent of surveyed firm's networking with domestic Research Institutions and research institutes was explored as shown in Table (3):

Table (3)
The Statistics of Sample Firms' Linkages with Domestic Research Institutions

Kinds of Linkages	Frequency of Replies	
	Count	%
Service Development	33	11.49
Production Processes Development	18	06.28
Participation in Conferences	87	30.31
Educational Institutions	91	31.70
Training Institutions	16	05.57
Financial and Managerial Research	42	14.65

The number of firms' employees who had participated in job-specific short courses at different institutes outside the firm during the last three years was as the table below:

Table (4)
The number of employees participated in extra-firm job-specific courses

Business Sector	Number of employees	Number of sample firms	Average number per firm
Services Businesses	249	21	11.85
Electrical Businesses	1043	15	69.50
Chemical Businesses	513	29	17.69
Textile and cloth Businesses	150	23	6.52
Food Businesses	340	24	14.16
Petrochemical Businesses	437	23	19.00

The existence of an office or a centre in charge of firm's relationships with Research Institutions is a means, which can facilitate the Research Institutions linkages. This Knowledge was explored by a question, which gave the results of Tables (5) and (6).

Table (5)
Firms Possessing a Specific Office to Facilitate further Linkages with Research Institutions

Centre for relationship with Research Institutions and research institutes	Frequency of firms	
	Count	%
	33	24.4

Table (6)
Sectoral Distribution of Firms with Research Institution Interaction

Business Sector	Number of firms with centre	Total firms	Centres per firm
	Count	Count	%
Services Businesses	9	21	42.86
Electrical Businesses	3	15	20.00
Chemical Businesses	9	29	31.03
Textile and cloth Businesses	2	23	08.69
Food Businesses	5	24	20.83
Petrochemical Businesses	5	23	21.74

Table (6) shows that except the Textile and cloth Business, more than 20% of other sectors established such centres.

The different tasks of such centres were obtained as shown in Table (7):

Table (7)
The Tasks of in-firm centre of relationships with Research institutes

Kinds of tasks	Number of replies	%
Administrative activities	9	27.27
Research and technological activities	6	18.18
Both of the above	18	54.54

The replies to the question regarding the firm's objectives and expectations from mutual relationships with the Research Institutions sector gave the results, which are shown in Table (8):

Table (8)
The Objectives and Expectations of Businesses in Relationship with Research Institutions

The Expectation and Objectives	Number of replies	%
To gain new knowledge for the solution of a particular problem	90	28.57
To gain knowledge about a new idea and new findings	66	20.95
To develop new services, products, processes, systems or materials	71	22.54
To improve the existing services, products, materials and processes	88	27.94

The comparison of the results of this table with that of Table 3, implies the difference between the kinds of current mutual relationships and those which will be expected.

Plans for future collaboration with domestic Research Institutions were explored using relevant questions which gave the result as shown in Table (9).

Table (9)
Sample Firm's Strategy in future Technological Co-operation with Research Institutions

Future Technological Co-operation	Research Institutions and Research Institutes	
	Count	%
	124	91.85

To discover some features of current interactions between Research Institutions and Businesses and to scrutinise the role that Research Institutions sector plays in technological innovative activities of surveyed firms, several structured interviews, which used the following questions, were conducted.

Table (10)

The Structured Interviews for Research Institution-Business Knowledge Exchange

Structured Interviews	
Question 1:	The role of research institutes in cultivating technological innovations in Businesses is of major concern among all nations. In this respect to what extent do Kuwaiti Research Institutions play their roles?(Please specify)
Question 2:	What kinds of policies and strategies are necessary as facilitators to provide a condition that the technological problems of Businesses could be solved by domestic research institutes?(Please specify)
Question 3:	How do you evaluate the consistency between Research Institutions educational programmes and research activities and technological innovation requirements of industrial sectors? (Please circle as an appropriate; 1 = Very little, 2= Little, 3= Moderate, 4 = High, 5 = Very high).
Question 4:	What are the essential barriers to the mutual technological relationships between Research Institution and Businesses?(Please specify)
Question 5:	What are the necessary motivational factors to link these two sectors to enhance the innovativeness of Businesses?(Please specify)

The outcomes of these interviews were given in Table (11).

Table (11)

The Results of Structured Interviews on Research Institution- Business Knowledge Exchange Relationships

Replies in brief	
For Q 1	Research Institution researchers could play an important role in business innovation activities, but very few of them currently are involved in such activities in a systematic and organised manner. So the current role of Research Institutions is minimal.
Q 2	Providing the required strategies and policies for solving the business problems by the Research Institution experts needs a long discussion but the following factors are very important in this regard;(1) change in the structure of Research Institutions and Businesses is needed to provide a climate for business research;(2) cultural change in the academia and Business so that they generate continuous improvement in both sectors;(3) governmental supportive policies for developing research activities.;(4) Focusing the Research Institutions research activities towards technological needs of the country.
Q 3	There is not enough consistency between current Research Institutions and the technological needs of Businesses, in general.
Q 4	The major barriers to the mutual relationships of Research Institution and Business are: (1) legal barriers concerning the Research Institution's income which must be paid by the governmental treasury. (2) General policy and tendency of higher education which forces the teachers towards educational not research activities. (3) lack of believe in Business experience in Research

	<p>Institutions (4) lack of attention and considerable honour to research works (5) lack of common language, referring to the different culture of these two sectors. (6) Lack of funding system to the research activities. (7) lack of tendency of business sector to invest in research activities.</p>
Q 5	<p>The motivational factors to link these two sectors properly could be as follows:</p> <p>(1)recognising the relevant culture by the supreme council for research (2) planning for research and innovation in business sectors, (3) encouraging businesses to form relationships with Research Institutions, (4) providing the incentive programmes for Research Institutions which are involved in business research as well as rewards and facilities for Research Institutions staff who co-operate with Businesses in this respect. (5) improving the incentive and associated rewards systems on business research works and securing special facilities for the researchers who are involved in those activities (6) creation of beliefs in business managers of the scientific and technological potentials of Research Institution professors and researchers. (7) providing appropriate policies to prevent the import of those products which can be designed, developed or modified indigenously. (8) finding the common culture and language of both partners. These two worlds should reach to a common approach for mutual relationships. (9) formation of joint- research centres, issuing joint scientific Journals, establishment of centres for business services in Research Institutions as well as Businesses and utilisation of Research Institution facilities by the Business.</p>

5 - Discussion of Results, Suggestions and Recommendations

In this study, we were able to find six kinds of relationships between Research Institutions and the sample firms as shown in Table 3. From these results it is obvious that there was considerably little involvement in the activities such as improvement and development of services, products, processes and technological training in the mutual co-operation between these two sectors. Also there were a big difference between the current type of relations and the expectation of surveyed firms as shown in Table 3 and Table 8. In addition, there are several possible channels for their mutual linkages, which already are not included in current relationships. Further the majority of firms announced their future plans for making effective relationships with the research institutes. With respect to this potential, it is time to the authorities and governmental organisations to issue appropriate policies and incentives to close these sectors as much as possible and in line their activities toward solving technological needs of different business sectors. Furthermore, only 24.4 % of sample firms had established a centre for their relationships with research institutes. This result also can be a matter of consideration.

These results suggest a special attention of policy makers to issue severe policies to bridge these two economic sectors much more closer than ever to achieve technological development goals and, in turn, economic prosperity.

These findings in general indicate that there is a substantial potential of innovative capability in domestic Research Institutions and research institutes due to their high educated and qualified staff. Both industrial and Research Institutions sectors are willing to make mutual linkages. However, there are several barriers such as different approaches, cultures and lack of a

common language to form these linkages. Creation of common approach to joint-co-operation within the two sides can relax the barriers. Another barrier is lack of appropriate reward and incentive systems to promote, encourage and support those who are being involved in joint-research activities. Lack of a suitable organising agent with the authority of issuing policies to collect the industrial sectors' technological problems and then, to search which Research Institutions to solve those business problems, is another barrier which needs special attention.

The following suggestions can provide the suitable ground for mutual co-operation of these two sectors:

(1) Creation of an interface centre among Research Institutions, Business and governmental organisations, from one side and the legitimates on the other side, is necessary for issuing appropriate economic, educational and industrial policies and inter-connecting all agents involved in technological cases. This centre with the following features is recommended;

- a- Possessing the power to authorise relevant policies wherever necessary.
- b- Having the authority to ask industrial sectors to define their technological needs and problems.
- c- Having the right to ask the research institutes to expose their capabilities to solve the technological problems. Establishing appropriate incentive systems can also do this.
- d- Having a relationship with the organisations responsible for issuing the policies for industrial and Research Institutions sectors to suggest the structural ideas and take their approval easily.

- e- Having the authority to offer monetary incentives or appropriate rewards to those parties, which are being, involved in mutual Research Institution- Business activities.
- f- Making a rich inventory system from the technological needs of the country.
- g- Having the legal power to ask the educational institutions to design a new curriculum or revise those, which need to be restructured, to meet the specific needs of business sectors.

- (2) Research Institutions must raise awareness amongst business managers through seminars, workshops and visits, by revealing their capabilities in solving business problems and the mutual benefit from close relationships:
- (3) The Research Institution must establish a policy to seek the different ways of ties with Business. They should sell their scientific and technological ideas, products and courses to the business sector by encouraging the business managers. Each year there must be seminars to invite the business managers to recognise their views , to get their needs , to assess and include the results in their next year curriculum. Engineering, Management and Business departments in Research Institutions must provide special industrial oriented courses and be much more familiar with the real needs of business sector.
- (4) Creating a technology management position at Research Institutions is one way to cover the objectives of both parties.

- (5) Changing structure of traditional Research Institution from disciplines and classical departments to interdisciplinary cooperatives with emphasis on learning, cross-disciplinary research and problem solving including activities outside the traditional library and classroom walls which provide the opportunities for important insights into innovation and change, collaboration and joint projects
- (6) Exchange of Research Institution and Business's staff can create a common language to understand each side. This interaction of Research Institutions and corporate staff also enriches the educational process
- (7) Upgrading and promotion of Research Institution can be conditioned to their involvement in industrial research activities.
- (8) A percentage of firms' sales volume should be allocated to their mutual relationships with Research Institutions.
- (9) Creation of an incentive system by the governmental authorities, for those Businesses firms, which their technological projects are offered to be solved by domestic research institutions

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