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The Role of Faculty-For-Factory Program in Developing the University-Industry Relationship

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ABSTRACT

Academic institutions shoulder the responsibility of serving the national economy through the enhancement of the role of applied academic research. Therefore, a national program has been developed under the name Faculty-For-Factory (FFF), in order to develop the relation between industrial and academic institutions.

This program aims at achieving the following:

1. The development of an applied model of cooperation between industrial institutions and academic institutions. This can be achieved through the establishment of a real cooperation between participating academia of different specialties on one hand and participating companies on the other hand. This kind of cooperation will benefit both academia and companies.
2. The increased participation of academia in the development and implementation of technical and administrative programs for the industrial institutions. Moreover, they can make use of their knowledge and experience in the practical field.

The results of this program have shown that this fruitful cooperation between industrial and academic institutions made a bond between them. Furthermore, the program has given academia the opportunity to develop their knowledge and apply their theoretical concepts in the field. This has been positively reflected on their growth and enabling them to make use of the technical experience needed to solve problems and develop their products and services. Also, this program is considered of utmost importance for the development of academia's abilities in teaching and academic research. Thus, students can get information and knowledge based on practical experience.

KEYWORDS: University, Industry, Partnership, Faculty-For-Factory (FFF), Jordan.

1. INTRODUCTION

The increase in global competition in an open international market, and its expected major implications on future industrial development and operations of industrial enterprises, especially Small and Medium size Enterprises (SMEs), necessitates that enterprises rely on enhancing the collaboration and interaction with the universities in search for methods to increase their competitive power. This has been encouraged by international competitiveness, rapid technological advancement and the growth of science-based and technology-intensive industries. Universities and industry representatives became more aware of the benefits and implications of such mutual relationships which have an impact on the future of both parties. More and more industrial companies and academic institutes realize that effective collaboration and partnership could be a solution for future competitiveness and prosperity of the academic institutions on one hand and the industrial companies on the other. These partnerships have led to some exciting and innovative changes in the structure and delivery of training programs. Companies that have proactively worked with universities have enhanced learning opportunities for their staff and increased organizational competitiveness (Davis, 2004: 121-124).

The prevalence and vitality of partnerships between industry and academia have increased dramatically over

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the last two decades and are likely to grow in forthcoming years (Gomes et al., 2005: 88-98). In theory, industry looks to academia primarily as a fountain of basic, leading edge research, knowledge, and as a wellspring of scientifically trained personnel. However, academics, as it is commonly believed, turn to industry for additional funding and for access to state-of-the art facilities and equipment. In fact, limited success stories have been achieved due to the difficulties of collaborative partnerships. Yet, a true partnership between industry and academia requires changes in the behavior patterns on both sides (Rabadi and Rawabdeh, 2003). Moreover, a structure that leads to successful collaborative ventures needs to be founded. According to Santoro (2000), University- Industry (UI) strategic alliance programs usually take place within four important components, including research support, cooperative research, knowledge transfer and technology transfer. University research has traditionally focused on generating and propagating basic forms of knowledge and integrating this knowledge into an overall learning agenda. Moreover, academics concentrate on revealing new scientific knowledge, useful for providing long-term insight on basic and applied research issues which become the foundation for training future scientists, engineers and researchers. On the other hand, firms are usually interested in utilizing the results of research to resolve current business problems or challenges of immediate concern in order to maximize earnings and stakeholders' wealth (Elmuti et al., 2005: 115-129).

There are three types of university/faculty members' contribution to the economy that should be considered in the analysis of the impact of the program: the fundamental and applied research activities of universities which contribute to the stock of scientific and technical knowledge in the economy; the provision of highly trained human resources with knowledge, technical and managerial skills; and UI technology-transfer activities which facilitate industry's access to the academic stock of technical knowledge (Rabadi and Rawabdeh, 2003).

Jordan, as a developing country, started attracting international manufacturing investments over the last few years. It is expected that since Jordan became a member of the World Trade Organization (WTO) and had an agreement with the European Union (EU), multinational companies will be encouraged to move their manufacturing operations to Jordan. Jordan's proximity to a lot of markets and the competitive advantage of its education sector make it an attractive location. Furthermore, since the macro-economic adjustment program took effect, and particularly since 1992, the general economic trends have been positive. This puts a huge pressure on the universities to prepare themselves in terms of research programs, graduates' capabilities and cooperation with the industry to fulfill the needs of the new comers and help in raising the level of local industries to compete globally.

This paper investigated a new form of cooperation that aims at enhancing the industry-university relationship by developing and implementing a program entitled Faculty-For-Factory (FFF). It presents the contribution of the program in the development and expansion of small and medium size enterprises and provides incentives to attract leading practitioners to develop and help those enterprises. The paper presents the programs' framework, management aspects and their implementation methodology with emphasis on the evaluation results.

2. LITERATURE REVIEW

Many attempts had been made for developing and promoting UI relationship programs. The following are some attempts of universities in Mexico, Canada, USA and Australia. Ovando (1991) presented the design, and the method of implementation, evaluation and follow-up of a successful faculty development program that effectively and efficiently met the needs of both part-time and full-time professors at a private university in Mexico. He illustrated some features of the program such as the presentation of theoretical skills, use of a variety of delivery strategies, practice in simulated and actual settings, teaching performance feedback, coaching for application, individualization, incentives for participation and administrative support. Dodge and McKeough (2003) explored the roles and motivation of the intern and the academic employer and professional associations that sponsor internships. They developed and examined the "Career Starts" Program in Canada and presented practical issues and objectives associated with such a program.

Harris and Zhao (2004) investigated the experiences of both faculty and hosting industrial companies' executives with internship programs in the USA. They reported that faculty internships are of growing value to

faculty and industrial organizations and that the continued development of experiences must be a priority. An interesting suggestion made by hosting executives was the hope that they could arrange internships with educational institutions, wherein they could also return to the academic environment to rekindle enthusiasm, obtain new skills and update their knowledge on issues facing the industry they represent. Ryan and Morriss (2005) outlined the experience and approach of an Australian university in developing and managing a university partnership within industry and described how the university had established a specialized strategic partnership unit for managing the customization and delivery of postgraduate award programs and executive education to industry. They found that some of the key issues that have contributed to the management of industry partnerships include project management of industry programs and flexibility in developing and delivering education programs to industry from a university perspective.

Several researches revealed that University-Industry alliances always face different difficulties to be solved. The inherent nature of applied research- its complexity, ambiguity, long term span, and tacit qualities- can create a series of crises that may work against a viable UI relationship. Universities and companies can build an effective relationships based on selecting a motivating problem, and creating team-based work, monitoring mechanism, personnel linkages and new organizational arrangement. Elmuti et al. (2005) discussed strategic alliances between corporations and institutions of higher education. The major underlying motives for creating these alliances and the critical success factors are also discussed. They highlighted the major advantages for the academic community, research funding and practical learning opportunities for students–and for industry– lower research and development costs and technology transfer opportunities that affect competitiveness. Academics still see companies as information sources for their researches, but they are also willing to participate in joint projects in which academic knowledge is not the sole output. The output was providing information for companies and universities with regard to how to embark on such cooperative endeavors (Gomes et al., 2005: 88-98).

Robertson (1998) presented a "University for Industry" model aiming at improving the quality of preparation of students for working life and to develop enterprising employees able to create and use opportunities, work effectively with others and learn throughout their lives in the development of entrepreneurship skills, personal effectiveness and transferable skills. Newman (1998) reported that collaboration with industry is also a useful vehicle in the area of student project work. The conventional view of this is the source of extra funding. Bogler (1994) reported that the relationship between university researchers and industrial sponsors represents only half of the picture – specifically, the costs associated with the collaboration. The other half refers to the rewards which result from this alliance, such as conducting research that could not otherwise be carried out. The implications of this include a fulfillment of the need for faculty for additional funding, exposure to state-of-the-art technology, the enrichment of classroom teaching, and the enhancement of social and economic benefits. Other benefits include learning from one's partner, access to knowledge networks, funding, global improvement of both management research and management practice, and blending knowledge as science and knowledge as culture (Gomes et al., 2005: 88-98). Moreover, through collaboration, universities get access to empirical data, which makes research more grounded in "real problems", and increases the likelihood of publication.

The literature revealed that more investigation is needed to identify new programs that enhance the interaction, collaboration and the cooperation requirements between the university and industry to solve the relationship problems and provide effective results for the two parties. Although the collaboration, cooperation and interaction levels are growing, yet, they do not reach the limit that satisfies both sides.

3. FIELD STUDY

The Faculty-For-Factory (FFF) National Program is a new form of programs that aims at bridging the gap between academia and industry in Jordan. It aims at promoting an actual form of collaboration between the Jordanian universities and the industry by providing a structural help to benefit faculty members on one hand and the industry on the other hand. It is a paid part-time short-term employment for faculty members who would like to practice their knowledge and develop their capabilities in real-life conditions. The FFF program is expected to give faculty members of a university an opportunity to sharpen their knowledge base to better illustrate conceptual topics through practical applications

by exposing faculty members to real-life experiences within the program time period.

For the companies (factories), faculty members contribute by providing technical expertise, additional manpower, training assistance and informal reviews. In addition, public relations, recruiting, and marketing efforts for participating firms may be enhanced. The impact of faculty members' involvements through knowledge transfer and practice tools and techniques on their teaching and guidance for students in practical aspects will be reflected in the process of preparing future potential employees for SMEs.

The goal of this program is to assist faculty members from different Jordanian universities in establishing partnerships with industry resulting in the development and expansion of small and medium size industrial enterprises. The program provides financial incentives to attract leading practitioners to develop and help those enterprises by several supporting agencies. These faculty members are expected to develop, define and conduct recognized practical projects that have a development potential that are related to the needs of a selected group of SMEs and getting paid by a third party. A third party is a group of financial support agencies, institutions and councils which are willing to support such an intuitive (FFF program). The two primary goals of the program are to:

- Promote an actual form of collaboration between the academia and the industry by providing a structural help to assist faculty members on one hand and the industry on the other hand.
- Practice some development programs in technical and managerial fields in the small and medium size enterprises by increasing the number of faculty members' involvements through knowledge transfer and practice improvement tools and techniques.

The FFF program is expected to achieve the following objectives for the faculty members:

1. Be exposed to the most recent problems within a particular field being targeted by a company.
2. Provide opportunities to apply theory to actual 'real world' problems.
3. Have the access to new equipment and lab resources.
4. Provide opportunities to enhance work skills, such as critical thinking, communication, business acumen and team participation.
5. Increase understanding of career possibilities and potential career directions.
6. Provide financial support during the educational experience.
7. Develop specialized areas of expertise which could enhance marketability of students after graduation.
8. Increase relevance of curricula as a result of input from the industrial sector regarding their needs and future directions.
9. Increase job opportunities within a specific industrial setting or through connections with other industrial settings.

The FFF program is expected to achieve the following objectives for the industrial companies:

1. Increase breadth and depth in specialized areas of research, with the potential to generate new and different types of research questions.
2. Increase likelihood of theory-testing and theory-building in a potentially technology-driven environment.
3. Increase attention to ethical and other human aspects of invasive technology or instrumentation as a result of student presence in a research project.
4. Enhance fundamental and applied research activities of universities in contributing to the stock of knowledge in the economy.
5. Get help from universities through providing highly trained human resources.
6. Be exposed to a source of supplies of ideas and inventions through technology transfer.

4. METHODOLOGY

In order to achieve the program goals and objectives, a steering committee called "FFF national committee" was formed. The committee consists of eleven members (six experts from academia from different Jordanian universities and five from the industry) to gear the program. Based on the required information about the scope of work of the program, the FFF committee adopted the following:

a) Procedure

1. The factory (an SME) interested in the FFF program that is seeking a faculty member should submit a request for FFF committee. All the Jordanian SMEs are eligible for this program conditioned by the approval of the support organizations/ agencies/ centers.
2. An interested faculty member is identified and informed in advance about the program objectives,

its procedures, and the nature and extent of their involvement with the company.

3. The faculty member conducts several visits to the factory for investigation and to prepare a preliminary diagnostic study. This step includes the establishment of clear expectations for faculty members, the time commitment required, the necessary framework in order for a faculty member to complete a project, and a procedure for reviewing the outcome of the project. The output of the diagnostic study should describe the assignment in greater detail with special emphasis on benefits to be accrued to the factory on one hand and the faculty member on the other hand.
4. After the diagnostic short period, a joint proposal and a plan that describes the current needs of the selected SME from the faculty member should be submitted to the FFF committee.
5. The faculty member selects a group of students to work with on the project. FFF committee discusses, modifies and approves the proposal and monitors the progress.
6. The faculty member meets with key personnel in the selected companies to help in cooperation with the managers to carry out the specified assignments/projects.
7. The faculty member conducts the plan of the project during the summer time (three months).
8. The FFF program director (the author) meets periodically with the faculty members to ascertain that their work is progressing as planned, that both parties' needs and expectations are being met, mutually agreements on adjustments in the project's schedules are reached, and to provide feedback on the participants' performance.
9. The faculty member prepares a final report that includes the project execution with a list of the existing problems and suggested plan/projects for future cooperation, and a systematic method and technique to solve the determined problems with details in the form of actions, charts, maps, tables, lists, and diagrams.
10. Two questionnaires (one for the company and one for the faculty member) need to be filled at the end of the program cycle to assess the level of satisfaction of the participants and companies with the process and outcomes of the program.

b) Eligibility

All faculty members in Jordanian universities are eligible to participate.

c) Faculty Member Responsibility

The faculty member who applied to participate in the FFF program is expected to:

- Identify specific expectations for success including implementation of those goals throughout the project.
- Participate in the everyday activities of the factory.
- Meet with matched industry representative to coordinate objectives and develop a common measurable set of goals.
- Commit a minimum of 10 hr/week in the company and immerse in each aspect of the daily operations.
- Supervise a group of students and guide them to enhance their skills.
- Submit the required progress reports.
- Present the work to the FFF committee and the representatives of the company.
- Develop a formal report describing activities of the project with pertinent accomplishments that should be submitted to the FFF committee. This report should contain reprints of publications, abstracts, manuscripts submitted, proposals, etc., which resulted from the assignment.

d) Factory Responsibility

The factory that applies to participate in the FFF program is expected to:

- Identify specific expectations for faculty to be integrated into the industry and a project for a faculty to complete and provide recommendations to the company.
- Provide appropriate environment through commitment of time, resources, personnel and facilities as a contribution to the faculty learning experience.
- Participate in on-going assessment process and compensate faculty for recommendations at agreed upon amount.

e) Program Issues

Twenty (20) program issues; 10 for faculty member participation and 10 for the company participation need to be tested during the program period. These issues are as follows:

Issues Related to Faculty Member:

1. Practice knowledge and develop capabilities in real life conditions in special science, technology and management fields.
2. Learn about knowledge and technology transfer.
3. Develop problem solving skills.
4. Develop communication skills and public relations.
5. Promote collaboration between the academia and the industry.
6. Earn money.
7. Reflect acquired experience in teaching and instructions.
8. Affect graduates to have better skills for entering employment.
9. Develop hands-on work experience.
10. Enhance knowledge for future curriculum development.

Issues Related to Company (Factory):

1. Improve employees' knowledge base of theoretical and practical applications.
2. Learn about knowledge and technology transfer.
3. Enhance employees' problem solving skills.
4. Enhance employees' communication skills and public relations.
5. Promote collaboration between the academia and the industry.
6. Be exposed to more types of recent scientific techniques.
7. Define unseen problems.
8. Solve some minor technical/managerial problems.
9. Apply alternative ways of doing things.
10. Get additional manpower.

5. PROGRAM IMPLEMENTATION ANALYSIS

Following the above mentioned procedure, the program was implemented with a participation of 38 companies from different industrial sectors and participants from different universities and disciplines. In order to investigate experiences of faculty members and gain feedback on the value of such experience from companies supporting such a program and suggestions for the improvement of a questionnaire was developed. The questionnaire contains data supplied by Jordanian companies that participated in the program. Each contact person who worked closely with the faculty member who participated in the program received a copy of the questionnaire to be filled.

Another questionnaire was developed and sent to the faculty members who participated in the program to be filled about their experience of implementing the project at the participated companies. The first part of the questionnaire focuses on the program issues, and was evaluated using a Five-Point Likert scale, where 1 represented "strongly disagree" and 5 represented "strongly agree". The questionnaire tested several subjects related to the details of the diagnostic study, the requested necessary facilities/requirements, time allocated for the project, availability of specialists from the company, acceptance level of the program, whether there is any potential for future cooperation with the company, willingness to participate for next cycle and the willingness to repeat the program at the same company. Part two solicited respondents' information on the firm and their experience such as firm size, firm type and a point view of the program in terms of benefits, pay, obstacles, time, resources and suggestion for improvement.

The questionnaire was validated by a small group of faculty members and companies' representatives who were asked to provide a feedback with respect to the wording of questions and ease of completion, with a particular emphasis on the FFF program issues. Their insights were used to modify the questionnaire prior to its distribution among companies and faculty members. The second part of the questionnaire consists of select-one-of-five questions, open-ended questions, and Yes/No questions. This format permitted the gathering of demographic data as well as faculty member-specific details about the program evaluation.

Both the companies and faculty members completed the questionnaires designed to evaluate the program and their perceptions concerning program evaluation in general and the statements associated with the program issues previously mentioned, in particular. A total of 38 responses were received, representing a response rate of 100 per cent since filling the survey is one of the requirements for issuing the financial payments. The companies' data in this paper will reflect the insights of participated companies that actually worked with faculty members during the summer of 2004.

The participated companies are divided into different industrial sectors that include: Engineering (9), Agriculture (2), Pharmaceuticals (5), Chemicals (6), Plastics (2), Food (6), Textile (3), Paper (2), and Mining (1). The faculty members' data were from the Jordanian

Table 1: Faculty member feedback for the program subjects.

Subject			
	Adequate	Suitable	Not Adequate
The details of the diagnostic study	30 (78.9 %)	8 (21.1%)	0
The requested necessary facilities/requirements	20 (52.6%)	18 (47.4%)	0
Time allocated for the project	22 (57.9%)	11 (28.9%)	5 (13.2%)
Availability of specialists from the company	16 (42.1%)	20 (52.6%)	2 (5.3%)
	Affirmative	Conservative	Negative
Acceptance level of the program	=30 (78.9 %)	=8 (21.1%)	= 0
Is there any potential for future cooperation with the company	Yes = 33 (86.8%)	Maybe = 6 (15.8%)	No =0
	Yes	Maybe	No
Willingness to participate for next cycle	=30 (78.9 %)	= 9 (23.7%)	=0
Willingness to repeat the program at the same company	Yes =28 (73.7%)	Maybe =9 (23.7%)	No =2 (5.3%)

Table 2.: Faculty member feedback for the faculty-member issues.

Issue	**Average**	**STD**
1. Practice knowledge and develop capabilities in real life conditions in special field	4.6	0.8
2. Learn about knowledge and technology transfer	4.0	1.0
3. Develop problem solving skills	4.3	0.8
4. Develop communication skills and public relations	4.6	0.6
5. Promote collaboration between the academia and the industry	4.8	0.5
6. Earn money	3.3	0.9
7. Reflect acquired experience in teaching and instructions	4.2	0.8
8. Affect graduates to have better skills for entering employment	4.2	1.0
9. Develop hands- on work experience	4.1	1.1
10. Enhance knowledge for future curriculum development	4.1	0.9
Average	**4.2**	**0.8**

universities. Four universities (University of Jordan (26), University of Science and Technology (10), Hashemite University (1) and Balqa Applied University (1)) participated in the program with faculty members from different specialties that include: Engineering (22), Agriculture (7), Pharmaceutical (5), and Medicine (1).

The Faculty Members' Feedback Analysis

The faculty members' feedback about the program subjects are presented in Table (1). The table shows that satisfaction level was high (80% or more) for the diagnostic study, acceptance level of the program, whether there is any potential for future cooperation with the company, willingness to participate for next cycle and the willingness to repeat the program at the same company. However, the results for the requested necessary facilities/requirements, time allocated for the project and availability of specialists from the company shows low percentages, i.e., 52.6% 57.9%, and 42.1%, respectively. Analysis of the results indicated that the weaknesses come from the side of the companies, particularly for those who did not understand the themes of the program.

Table (2) shows the faculty members' feedback about the faculty members' satisfaction/achievement with the ten issues specified by the program. It shows that the promotion of the collaboration between the academia and the industry is the best result that has been achieved with an average score of 4.8/5.0. Among the 10 issues, getting practice knowledge and develop capabilities in real life conditions in special field, developing communication skills and public relations scored high values of achievement, i.e., 4.6/5.0. These three issues were the cornerstone of the program and show that the program is in the right track.

Moderate values of satisfaction have been noticed for learning about knowledge and technology transfer, developing problem solving skills, reflecting acquired

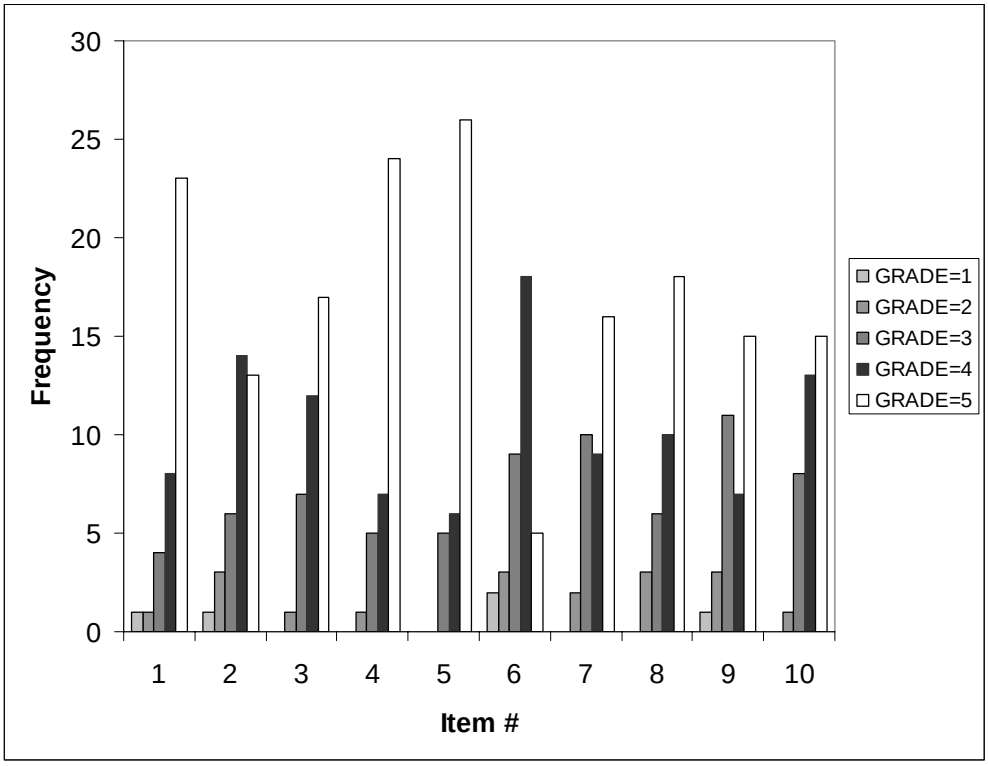

Figure 1: The distribution of the level of satisfaction for the participating faculty member for each issue of the 10 issues.

Table 3: The company feedback for the program subjects.

Subject			
Level of satisfaction about problem solution	Average= 4.24	SD=0.83	
Did the company propose for an extension of the project	Yes= 29	No=9	
Did the program achieve the company's objectives of benefiting from faculty members	Yes= 34	No=4	
Are you willing to participate for the next cycle	Yes= 35	No=3	
Are you willing to cover expenses fully in the next cycle	Yes=10	Partially=16	No=12
What is the level of faculty member Competency (1 Very strong and 5 very weak)	Average= 4.52	SD=0.76	

experience in teaching and instructions, affecting graduates to have better skills for entering employment, developing hands-on work experience, and enhancing knowledge for future curriculum development. Probably, one of the reasons for that is most of the participants is developing such a relationship with industry for the first time. The worst results were for earning money out of this participation. It is noticed that the level of satisfaction about the amount, schedules and mechanisms of payment is low with an average value of 3.3/5.0. All in all, the average value for the assessment of the ten issues and as such the program shows above average satisfaction level with 4.2 in average and 0.8 in standard deviation. This encourages the national committee to promote the new cycle of the program with good results in the current cycle implementation.

Figure 1 shows the distribution of answers for the ten issues related to faculty members over the 5-point Likert scale. For the results of the issues 1, 4 and 5 (see Table 2 for the issues numbering) a shift toward the strong agree (satisfaction) can be noticed. It is noticed that approximately, all of the participants strongly agreed upon the fact that this program is a truly linker of the academia and industry and a practical mechanism for promoting the collaboration between them. On the other hand, the opinion about the earning money issue shows

Table 4: The company feedback for the company issues.

Issue	Average	STD
1. Improve employees knowledge base of theoretical and practical applications	4.2	1.1
2. Learn about knowledge and technology transfer	4.1	1.2
3. Enhance employees problem solving skills	3.8	1.0
4. Enhance employees communication skills and public relations	3.7	1.2
5. Promote collaboration between the academia and the industry	4.6	0.9
6. Be exposed to more types of recent scientific techniques	3.7	1.3
7. Define unseen problems	4.2	1.1
8. Solve some minor technical managerial problems	3.7	1.1
9. Apply alternative ways of doing things	4.0	1.1
10. Get additional manpower	3.4	1.2
Average	**3.9**	**1.1**

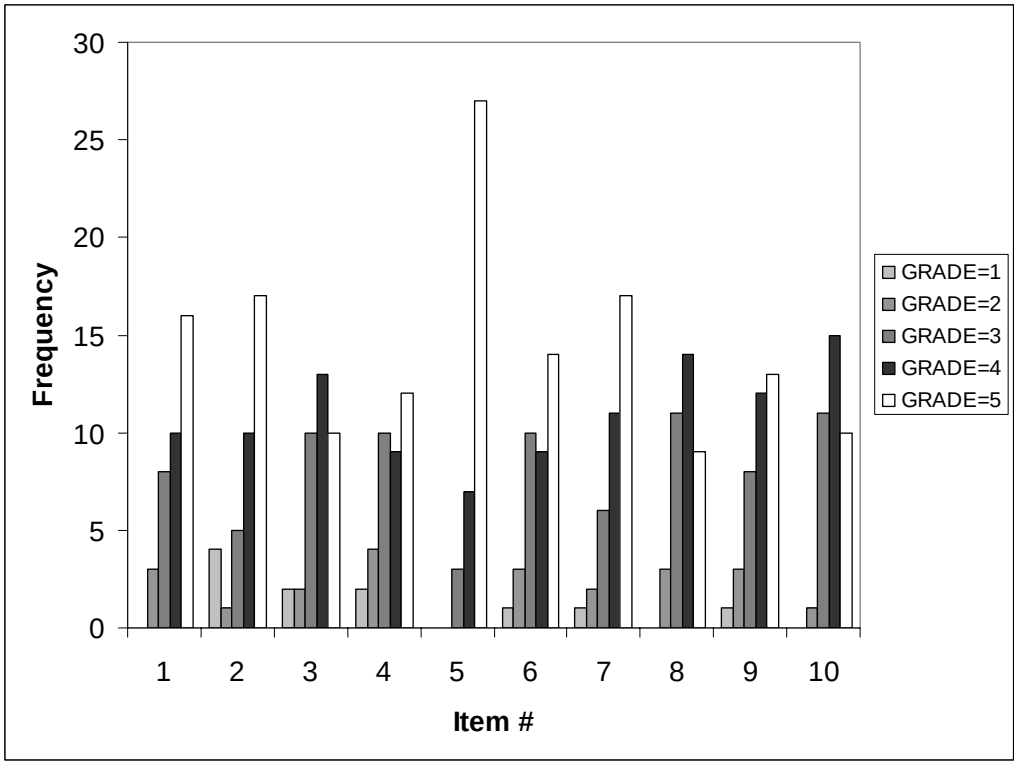

Figure 2: The distribution of the level of satisfaction for the participated company for each issue of the 10 issues.

that strongly disagrees and disagree scored significant points. It is also noticed that, 2, 3, 7, 8, 9 and 10 issues scored above average with some small portion of disagree and rare values for strongly disagree.

The Company (Factors) Feedback Analysis

Table (3) shows the companies' feedback about the factory different subjects. It is noticed that there is a high level of satisfaction for delivered solution of the specified problems identified at the first stage of each project at each company (factory) based on the average score of 4.2 and a standard deviation of 0.83. From the side of the company this is in agreement with the result of the second question which shows 29 companies (76.3 percent) that are willing to go for the next cycle of the program by proposing extensions of the projects. Also, 34 companies (89.4 percent) mentioned that the program achieved the company's objectives to benefit from faculty members by solving the specified problem and working on an extension to support the company further through the willingness to participate for the next cycle in which 35 said yes for the participation in the next cycle of the program.

One interesting finding is that even though the companies benefited from the 3-months staying and minor problem solving period and support, and they mentioned that they are willing to participate in the next cycle and work for the extension project, only 10 companies (26.3 percent) of them are in favor of total financial support of the new project extension compared to 16 (42.1 percent) and 12 (31.6 percent) companies are willing to support the project extension partially and no support, respectively. The reasons for this are many but mainly the reason is the financial difficulties in these companies from one side and the minor impact the FFF project have achieved due to time limitation from the other, even though the companies mentioned that the competency level of the participant is high (i.e. Average = 4.52/5.0 with SD=0.76) .

The companies' feedback about the program of 10 company's with related issues is presented in Table (4). The feedback can be grouped into 3 levels; the first level is the one in which the dominant level of satisfaction is "strongly agree". This is achieved with one issue which is promoting collaboration between the academia and the industry (Average=4.6/5.0 and SD=0.9). It is noticed that both; the faculty members and companies who participated in the program agreed on this issue with high level of satisfaction. The second group of issues is the agree-level in which the level of satisfaction is close to 4.0. Issues like improving employees' knowledge base of theoretical and practical applications, learning about knowledge and technology transfer, defining unseen problems and applying alternative ways of doing things with average scores of 4.2, 4.1, 4.2, and 4.0, respectively. These issues need more time to sense its impact and reach the "agree" level of satisfaction.

Enhancing employees' problem solving and communication skills and public relations, being exposed to more types of recent problem techniques, solving some minor technical/managerial problems and getting additional manpower are the issues that have questionable satisfaction level with average values of less than 4.0 and above 3.0. This third group represents tangible results on the daily operations and impacts of the employees in particular. It seems that the expectation was high from the time that the faculty member spent at the factory and the impact of his interaction with the different management level representatives. of particular interest which supports this claim is the issue of having the faculty member contribute to the manpower of the company he is working in which scored the lowest average value of 3.4/5.0 with SD = 1.1.

Figure (2) illustrates the distribution of the feedback for the company's issues based on the 5-point scale. Only one issue which is the promotion of the collaboration between the academia and the industry has scored "highly strong" and "strong" satisfaction levels from approximately all the companies' point of view. On the other hand, learning about knowledge and technology transfer has scored some dissatisfaction levels in which more than 10 companies mentioned that this issue is not on the top of the list for the output of the program. Enhancing employees problem solving, communication skills and public relations, being exposed to more types of recent scientific techniques, solving some minor technical and managerial problems, getting some additional manpower and applying alternative ways of doing things are among the issues that are distributed over the 5 point-scale with more to be neutral. These issues are among the ones that need more time, effort and investigation to be clarified and sense their impact.

6. CONCLUSIONS AND RECOMMENDATIONS

During the implementation of the FFF program, a true partnership between the Jordanian universities and industry has been achieved and a range of elements that may contribute to developing and sustaining partnerships between education and industry has been identified. An important issue that has emerged is that universities seeking to develop partnerships with industry need to operate in a manner that is compatible with the expectations and operations of industry. This implies the need for universities to be readily accessible and responsive to enquiries from industry. Additionally, there is a necessity to adopt a flexible approach to the development of content and delivery of programs without compromising academic objectives. From a university perspective, this potentially has structural, staffing and process implications.

The academia in Jordan has managed this by creating a self-contained Faculty-For-Factory (FFF) program that has a level of autonomy, although it is still closely linked to universities' policies. Faculty-For-Factory offers regular communication, both formal and informal, between the universities and their industrial partners which play an integral role in developing an understanding the expectations, requirements and

limitations of the two partners. Critically, FFF also contributes to developing a long-term relationship between the two entities. The key finding from this study is that both parties agreed upon the program as a mechanism for promoting the relationship between academia and industry. Regardless of the explanation(s) for the faculty member/factory differences, the results provide support for the establishment of a formal needs/expectations process between prospective companies (factories) and prospective faculty members.

It is recommended that this evaluation to be carried out again at the end of the projects' extensions and investigate if there is a trend in the satisfaction levels among the companies to the specified program issues. Also, based on the success of the current cycle, it is recommended for the FFF committee to prepare the implementation of the next cycle taking into consideration the evaluation results of the current cycle.

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دور برنامج "دكتور لكل مصنع" في تطوير العلاقة بين الصناعة والمؤسسات الأكاديمية

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ملخـص

تعزيزاً لدور البحث العلمي التطبيقي الذي تقوم به المؤسسات الأكاديمية لخدمة الاقتصاد الوطني، وانطلاقاً من الحرص على تطوير العلاقة بين الصناعة والمؤسسات الأكاديمية؛ تم تطوير وتطبيق برنامج أطلق عليه البرنامج الوطني: "دكتور لكل مصنع". يهدف البرنامج إلى تحقيق أمرين هما: تطوير نموذج تطبيقي للتعاون بين الصناعة والمؤسسات الأكاديمية وذلك من خلال إقامة شراكة حقيقية بين أعضاء الهيئة التدريسية المشاركين في البرنامج من ذوي الاختصاصات المختلفة من جهة، والشركات المشاركة من جهة أخرى، بما يعود بالنفع والفائدة على كليهما. ويتمثل الهدف الثاني للبرنامج في زيادة مشاركة اعضاء الهيئة التدريسية في تطوير وتنفيذ برامج فنية وإدارية للمؤسسات الصناعية وتعزيز معارفهم وخبراتهم في المجالات التطبيقية. أظهرت نتائج البرنامج ان هذا النموذج من التعاون المثمر بين الصناعة والأكاديميين قد حقق الربط بين الصناعة والمؤسسات الأكاديمية والبحثية؛ إذ وفر البرنامج الفرصة للمشاركين من أعضاء الهيئة التدريسية لتطوير معارفهم وتطبيق المفاهيم النظرية اداء وتجربةً وواقعاً، الأمر الذي انعكس في نهاية المطاف ايجاباً على الشركات المشاركة فيه، وذلك من خلال زيادة نموها وتمكينها من استفادتها من الخبرات الفنية اللازمة لحل مشكلاتها وتطوير منتجاتها وخدماتها. كما شكل هذا البرنامج رافداً مهماً لتطوير قدرات أعضاء الهيئة التدريسية في التدريس والبحث العلمي وتزويد الطلبة بالمعلومات والمعارف المبنية على الخبرة العملية.

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