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The Future of Engineering Education in Palestine

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Abstract

Engineering education in Palestinian Universities enjoys a pivotal role in fulfilling the demand for skilled personnel who are cornerstones in the present state building endeavour. Palestinian Universities burgeoned fast with whatever adversities that accompany uncontrolled growth. Tertiary education under the jurisdiction of the Ministry of Higher Education follows a 12-year of schooling programs. Higher education is hitherto limited to undergraduate studies albeit some select programs extend into advanced degrees. Research activities after graduation are minimal due to the absence of a national research focus. Expertise of international standards is obligatory. Producing resilient and intellectually mature human capital is the goal. Engineers being a politically influential group are slanted to face the challenges of globalization. They shoulder the onus of contributing decisively towards the socio-economic development of the emerging state. However, the lack of parity between market demand and engineering graduates creates yet another problem of an abhorring dimension. The repercussions of such phenomenon should be dealt with effectively.

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1. Introduction

Palestinian Universities in the Palestinian Territories occupied by Israel since 1967 succeeded, par excellence, in making tertiary education readily available to all young men and women at an affordable cost whence traditionally it was the sole privilege of the elite. However, the whopping number of graduates from the Palestinian Universities in recent years coupled with an increasing rate of unemployment and restricted

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development in many areas as a result of the seemingly continuous occupation of West Bank and the siege of Gaza Strip represent real challenge for policy makers at all levels. It is of interest to note that the prevailing substantial unemployment statistical figures are not diminishing the demand for higher education. Moreover, considerable numbers of young engineers expatriate to look for employment in the Arabian Gulf area or in other more promising parts of the world.

The present study attempts to focus proper attention on the present academic aptitudes of engineering professionals in Palestine and to map out the future of the profession. The study addresses issues of engineering education such as profile, curricula, practical training, demand and supply, accreditation and international benchmarking; in a nut shell the study focuses on quality matters after the quantity issue has been effectively dealt with. It intends to scrutinize the effect of the continuously increasing number of graduates on the general well being of the career.

2. History of Engineering Education in Palestine

The initiation of engineering education in the Palestinian Territories started in 1978 by the simultaneous establishment of 5 engineering departments in the West Bank; two of which were at An-Najah National University while the other three were at Bir Zeit University. Presently, there are 54 engineering undergraduate programs in 8 universities among the 14 universities that are spread over the West Bank and the Gaza Strip. The Ministry of Education and Higher Education regulates and monitors the quality of education in these universities through the Accreditation and Quality Assurance Council [1]. The official medium of instruction in all Palestinian universities is English.

The total area of the Palestinian Territories [the West Bank and Gaza Strip combined] is 5950 square kilometers, with a population that slightly exceeded four million in 2010. The number of registered engineers in the Palestinian Territories climbed to a whopping 14,000 in the year 2010. The number of engineering graduates from Palestinian universities increased from around 250 graduates in 1999 to more than 1500 graduates in 2009. The engineering faculties in Palestinian universities award a Bachelor of Science degree in 12 different disciplines; some universities offer a Master of Science degree, albeit on a rather narrow scale and in limited disciplines. All local universities follow the semester model, where the students in general are required to complete nearly 160 to 175 credit hours for graduation; this extends over a period of five years. There are serious attempts to decrease the number of credit hours necessary for graduation; the desire of the administrations to obtain ABET accreditation [2] is making positive contribution in ameliorating the present study programs to meet international standards.

Although the graduates of engineering programs are in demand locally and abroad, yet it is noticed that most of them work with contracting companies. Seldom graduates work with high-tech industry. Furthermore, it is no secret that the level of education in local universities is on a perpetual steep decline; some informed administrators argue that this is a global observation that spans other Arab countries. Students admitted to engineering study programs form the cream of the crop of high school students. Students with less than 90% average in the Palestinian Matriculation [i.e. tawjihi] are not admitted to engineering schools. However, it is widely observed that once students are admitted to the school of engineering their interest in the academic exercise quickly dwindles. This observation prompted the following study which aims at quantifying the depth and the extent of such a manifestation. Once this is assessed the intension is reduced to curbing the present decline by designing a reverse action to this trend. Apathy towards academic achievement seems to be taking an enormous dimension; unless it is immediately confronted and curbed it will inevitably lead to ominous repercussions.

3. General Observations

Engineering education in the Palestinian Territories started in the late seventies while the home land was as it continues to be under what seems to be a perpetual Israeli military occupation. Before higher education reached maturity, the number of universities multiplied to reach the whopping number of 13 in a geographic area of about the size of Delaware. While engineering education was the privilege of the financially able and the elite it became available to all people provided that students satisfy admission requirements. Ever since their inception Palestinian universities formed suitable confrontation grounds between Palestinian youth and the Israeli military or the Israeli settlers. During this period of time the territories witnessed two major popular uprisings that together lasted for more than 15 years. Those events had negative impact of the whole aspects of life that included but was not limited to all levels of education, university education included.

Due to various reasons that include lack of political stability, financial security and otherwise, most faculty members are local academics but went overseas for advanced studies and returned home as faculty members; industrial experience as well as academic experience amongst them is rather modest to say the least. Furthermore, the number of engineering students far exceeds the capabilities of available faculty members; that is to say that classes are over populated. In the local market the technical level of engineering practice is modest due to the nature of projects. Palestinian engineers by enlarge are distant from the cutting edge whence the Engineers' Syndicate has its own inherit limitations. Overtime work is a continuous favorable exercise to almost all faculty members; this is in order to augment the generally low university salary level. This runs throughout the academic year and flows into summer recesses. In most areas of engineering, serious research activities are simply absent; this reduces faculty members to instructors far from the cutting edge of their respective disciplines.

On the other side of the desk, all students in general have the same high school background, same social background and the same culture. No possibility to widen the scope of thinking by the exchange of ideas through mingling with students of different cultures neither is there a possibility for improving proficiency in foreign languages. This seemingly trivial matter proves time and again the validity of cultural exchange impact on the individual's personality development. Finally, the lack of employment opportunities adds to students' apathy and poor motivation. This is clearly manifested and reflected on classroom achievements. This is in blunt contradiction to the continuous striving of all university administrations to seek better and bigger accreditations and quality assurances.

4. Methodology

This study is partially based on a recent survey that was conducted by the ABET [2] Management Team at An-Najah University on more than 400 graduates who were selected from six different engineering programs. They are: Civil Engineering, Electrical and Communication Engineering, Chemical Engineering, Industrial Engineering, Mechanical Engineering and Building Engineering. These Engineering Programs were selected because of their relatively large student body. The Alumni were asked various questions regarding their careers, their salaries, their employment details, their prospects as well as their future plans for continuous improvement and upgrading. One main objective of the survey was to collect responses or feedback from Alumni who presently work outside Palestine. The information would in turn help the engineering faculty compare the prospects of the local engineering market with the global one.

The study is also based on a statistical study, executed recently by Jerusalem Center of the Engineers Association, about the prevailing conditions of engineering work in Palestine.

5. Results of the survey

The results of the survey are astounding; of the 2008-2011 graduates about 30% are presently unemployed. Of those who work 33% are employed outside the country. It must be noted that for 50% of the surveyed engineers the monthly salary bracket is between US \$200 and \$500. Figure 1 shows the percentage of respondents working outside the country. For the 33 % who work outside Palestine, 76% of them work in The Kingdom of Saudi Arabia.

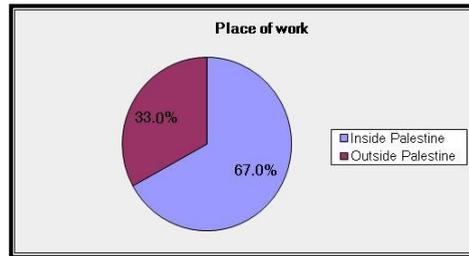


Fig. 1 Place of work

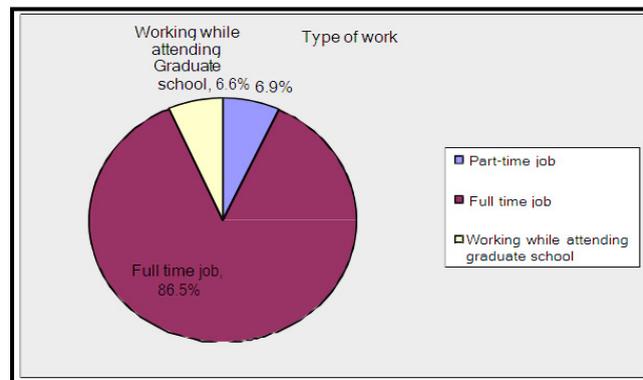


Fig. 2 The distribution of Respondents According to the Nature of Work

Among all alumni respondents 90.3 % work in governmental institutions as shown in Figure 3.

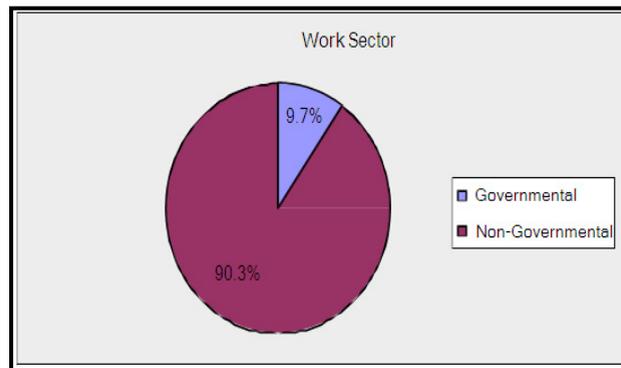


Fig.3 Work Sectors

93.4 % among the respondents found a job or career in less than one year. Figure 4 shows the distribution of the respondents according to the waiting period for employment.

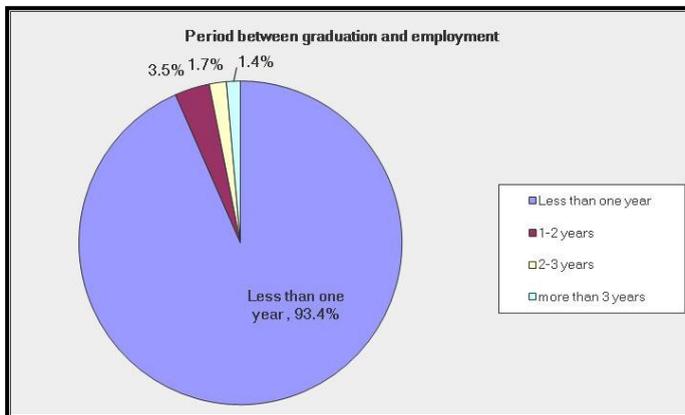


Figure (4): Period for Employment

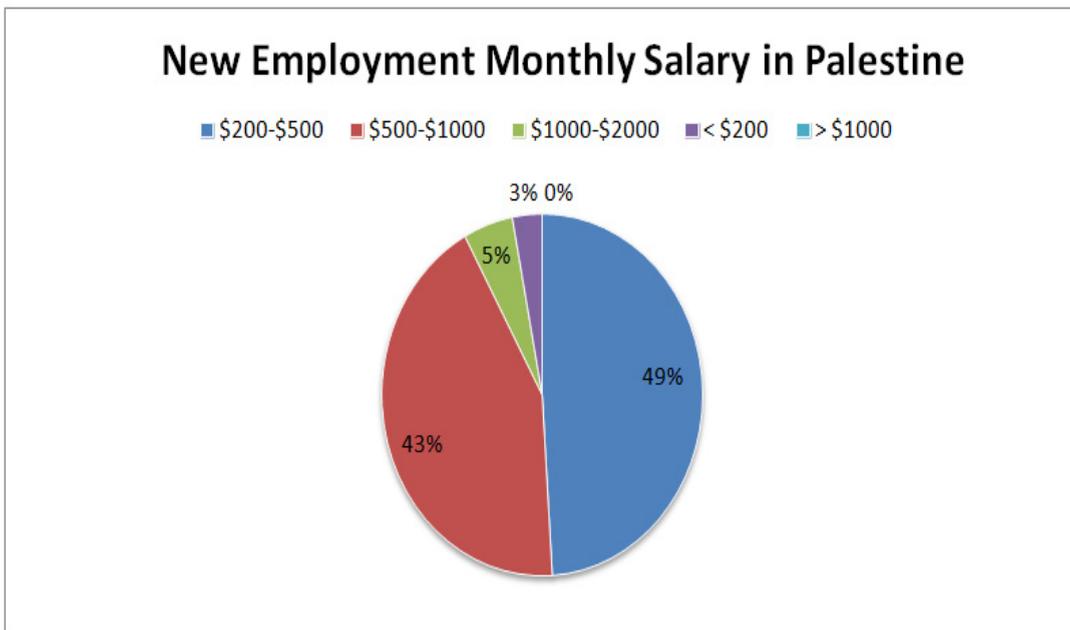


Fig. 5: Fresh Graduates Salaries in Palestine

Figure 5 shows that the majority of fresh graduates who work in Palestine start their careers with a monthly average salary that ranges between \$ 200 - \$500 for 49% of the respondents and between \$ 500- \$ 1000 for 43% of the respondents

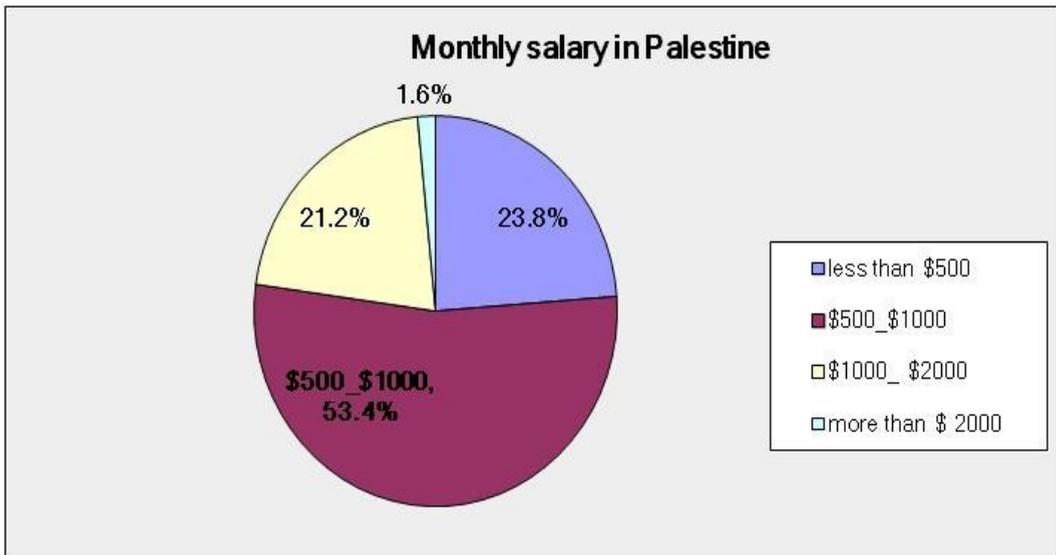


Fig.6: Alumni Salaries in Palestine

The majority of respondents (more than 50%) who work in Palestine have salaries of less than \$ 1000 monthly while less than 2% are those who have salaries better than \$ 2000 monthly. Figure 6 shows the distribution of respondent alumni working in Palestine according to their salaries. The majority of respondents (more than 50%) working outside Palestine are paid between \$ 1000 and \$ 2000 monthly. Figure 7 shows the distribution of those alumni working outside Palestine according to their salary. The poverty line in Palestine for a household of two adults and three children was set in 2010 at a monthly income of US\$ 609.

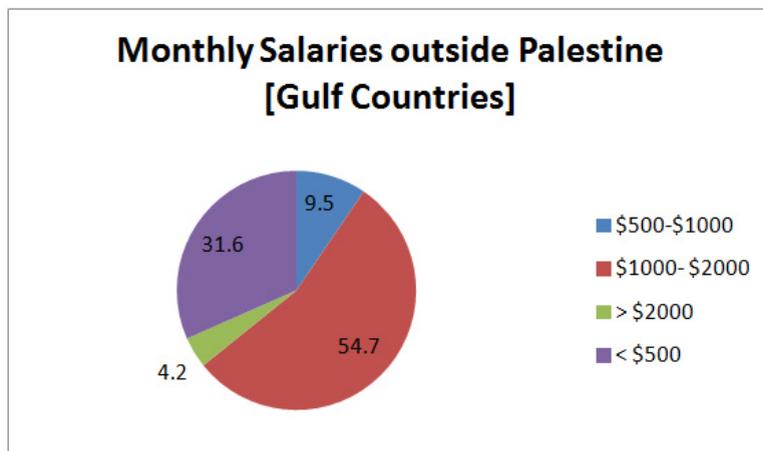


Fig. 7: Alumni Salaries outside Palestine

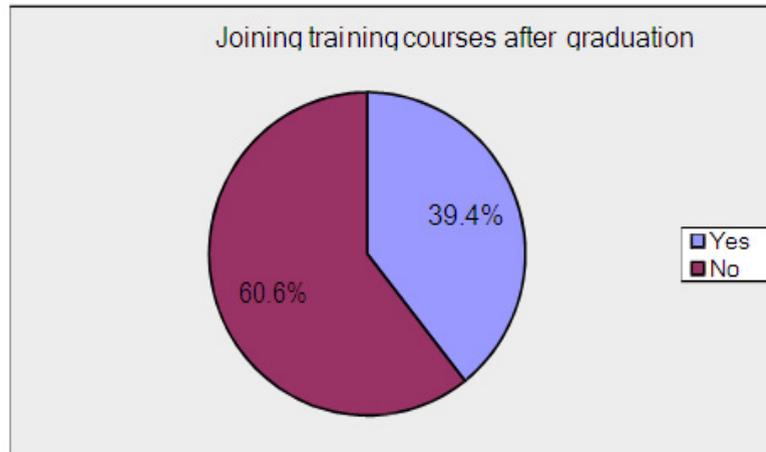


Fig. 8: Joining training courses after graduation

The majority of respondents (61%) did not attend any course after graduation. For the 39% who attended courses, they mentioned that they participated in around 3 training courses after graduation. Figure 8 shows the distribution according to the participation in training courses after graduation.

6. Conclusions and Recommendations

The present study clearly reflects the sizable ratio of unemployed engineers especially among new graduates. This comes from the increased number of graduates in various engineering majors at a time of decreasing ability of the local market to absorb them. That is due to the fragile economy that emanates from the absence of economic stability and security resulting from the turbulent political unrest in the region.

The study also reflects the tendency of more than 50% of the fresh graduates to work outside Palestine. Engineers expatriate because of the lack of work opportunities added to the meagre salaries and the poor job market available locally.

Based on the above conclusions, the following is a proposed solution for absorbing the tremendous number of the graduate engineers in a land still waiting to be independent. The suggested solution is presented below and follows two parallel tracks:

Track I - Developing Curriculum of Engineering Education to Meet Local and Global Requirements:

In order to prepare engineers to work on a global scale, they need to acquire much more advanced core knowledge as well as technical skills and soft skills to acquire the growing share of engineering employment in non-traditional, less-technical engineering work and knowledge-based "services" economy. The education of engineers must prepare them for the comprehensive disciplinary nature of the problems they are to face. Following the Malaysian experience in setting forth the attributes needed for the graduates of 2020 to reach the new generation [3]. The following attributes are presented for our own graduates:

- Ability to apply knowledge of mathematics, pure and applied sciences.
- Ability to design and construct experiments as well as to analyze and interpret data.
- Ability to formulate or design a system, process or a program to meet desired needs.

- Ability to function on multidisciplinary teams.
- Ability to identify and solve engineering problems.
- An understanding of professional and ethical responsibilities.
- Ability to communicate effectively.
- A broad education necessary to understand the impact of solutions in global and social context.
- The recognition of the need for and an ability to engage in real life-long learning.
- The knowledge of contemporary issues.
- Ability to use techniques, skills, and modern scientific and technical tools necessary for professional practice.
- Strong analytical skills.
- Practical ingenuity and creativity.
- Business, management skills and leadership skills.
- Ability to put problems in their socio-technical and operational context.

Track II - Supporting the Outsourcing Engineering Services

The culture of outsourcing services seems to be the prudent solution for a country like Palestine striving to be an independent state, in need for a strong economy that keeps its human resources living in the country in an acceptable living standard and not pushing them to look for jobs abroad.

Some companies particularly in the field of computer engineering, structural and architectural engineering successfully commenced to outsource services; thus providing new graduates with proper job opportunities. Such experience needs to be supported and adopted as many other countries already did. India, Malaysia, Jordan and other countries have excellent experience in this direction.

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