Education, Training and Employment of Agriculture Sector in Jordan

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Abstract: Agriculture is of great importance in the economies of countries, especially developing countries, because of their impact on the economic, social and environmental aspects of societies. In Jordan, the agriculture sector is divided into two sectors; plant production and livestock production, the contribution of agriculture sector in Gross Domestic Product GDP is considered moderate, but it has an importance in developing rural, a source of employment and income for the Jordanians. Jordan suffers from the lack of water resources, since 90 % of its area receives less than 200 mm rainfall per year. There are three levels of agricultural education providers in Jordan; High-Schools for two years, Junior Colleges-Diploma for two years and Colleges of Agriculture-Bachelors for four years. The agriculture, forestry and fishing constitute 2 % of Jordanians employed in all economic activities in the country. Every year the Ministry of Agriculture employ and train hundreds of agriculture engineers, also the Agricultural Engineering Association trains about 400 engineers and help them in finding jobs and establishing their own businesses. There is in increase in the number of graduators; that widen the gap between the supply and demand, also the training programs does not meet some of the professional’s requirements, in addition to its weakness. So, there is a need to limit the number of the accepted students in the agricultural collages and develop training programs required in the agriculture sector.

Key words: Education • Training • Employment • Agriculture

INTRODUCTION

Agriculture in all countries considered, a basic supporter of social and economic development and it plays a major role in protecting the bio-diversity and environment, in addition to environmental balance and sustainable use of resources, in order to preserve them for future generations. On the other hand, agriculture occupies a unique position in the strategic planning of many countries because of its impact on the food security of the population. In addition, human being depends greatly on the amount, type and quality of the food and medicine provided by agriculture [1].

In Jordan, the contribution of agriculture sector in GDP considered moderate, but it has an importance in developing rural, a source of employment and income for the Jordanians, mainly in the rural and Badiya areas. The sector of agriculture in Jordan is divided into Plant Production sector and Livestock sector; Plant Production Sector includes: fruit trees (olives, citrus, grapes, pome fruits, stone fruits, date palms, banana…etc.), vegetables (tomato, eggplants, potato, cucumber, peppers…etc.) and field crops (wheat, barley, lentils…etc.), while the Livestock Sector includes: sheep, goats, cattle and poultry [2].

The Reality of the Agricultural Sector in Jordan:

Water: It is the most important factor for agriculture; Jordan suffers from the availability of the water resources. In addition to that, Jordan is considered among the poorest countries in the world for the availability of water resources. Therefore, Jordanians should change their water consumption habits and eliminate water loss for household usage, looking for new water resources like dragging water from neighboring countries, invest in new projects that eliminate water use and expand in water harvesting [3]. Also, farmers should use new technology in enhancing irrigation systems. In addition, water sources and quantities in Jordan are summarized in the following Table (1):
Table 1: Water sources and quantities in Jordan:

<table>
<thead>
<tr>
<th>No.</th>
<th>Water sources</th>
<th>Quantity (million m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ground water</td>
<td>320</td>
</tr>
<tr>
<td>2.</td>
<td>Renewable surface water</td>
<td>340</td>
</tr>
<tr>
<td>3.</td>
<td>Treated water</td>
<td>190</td>
</tr>
<tr>
<td>4.</td>
<td>“Peace Treaty” water</td>
<td>100</td>
</tr>
<tr>
<td>5.</td>
<td>Non-renewable ground water</td>
<td>90</td>
</tr>
<tr>
<td>6.</td>
<td>Desalination of ground water</td>
<td>70</td>
</tr>
<tr>
<td>7.</td>
<td>Total</td>
<td>1110</td>
</tr>
</tbody>
</table>

Table 2: Climate area and average rainfall in Jordan:

<table>
<thead>
<tr>
<th>Climate area</th>
<th>Annual rainfall (mm)</th>
<th>Area (Thousands of km²)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi desert (Badiya)</td>
<td>200</td>
<td>80.8</td>
<td>90.5</td>
</tr>
<tr>
<td>Dry areas</td>
<td>200-300</td>
<td>4.90</td>
<td>5.5</td>
</tr>
<tr>
<td>Semi dry areas</td>
<td>300-400</td>
<td>1.70</td>
<td>1.9</td>
</tr>
<tr>
<td>Semi humid areas</td>
<td>400</td>
<td>1.90</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>89.3</td>
<td></td>
</tr>
</tbody>
</table>

According to [4, 5].

Referring to the available quantities summarized in Table 3. Agriculture consumes 650 million m³, which accounts for about 60% of the total resources.

Climate and Rainfall: There are four climate areas in Jordan that receives different amounts of rain during winter, as summarized in Table (2):

Topography of Jordan: Jordan has about 89.3 thousand km² of land area, in which 90% of it receives less than 200 mm rainfall per year (Figure 1). Moreover, Topography of the Jordan land is classified according to the followings [6]:

Jordan Valley Areas: Stretching from the south to the north of the Kingdom, with about 360 km long and is part of the Great Crater Pit which extends from East Africa to southern Turkey with a length of 6000 km. Its drop from sea level ranges from -212 m to -400 m at the Dead Sea. The region is hot in the summer and warm in winter and the rain ranges from 70 mm in the south to 350 mm in the north of Jordan [7].

It has an area of about 2.7 million dun, considered the main agricultural area in Jordan and depends mainly on irrigation water that pulled from rivers and dams. The area of cultivated land is estimates at 350 thousand duns and the area considered poor in
Table 3: Distribution of land uses in the Jordan Valley Areas:

<table>
<thead>
<tr>
<th>Uses</th>
<th>Area (thousand duns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>trees</td>
<td>60</td>
</tr>
<tr>
<td>Vegetables</td>
<td>270</td>
</tr>
<tr>
<td>Cereals</td>
<td>20</td>
</tr>
<tr>
<td>Forests</td>
<td>65</td>
</tr>
<tr>
<td>Pasture and non-planted areas</td>
<td>1875</td>
</tr>
<tr>
<td>Water areas</td>
<td>465</td>
</tr>
<tr>
<td>Total</td>
<td>2755</td>
</tr>
</tbody>
</table>

Table 4: Distribution of land uses in the High Land Areas:

<table>
<thead>
<tr>
<th>Uses</th>
<th>Area (thousand duns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit trees</td>
<td>800</td>
</tr>
<tr>
<td>Vegetables</td>
<td>100</td>
</tr>
<tr>
<td>Cereals</td>
<td>2010</td>
</tr>
<tr>
<td>Forests</td>
<td>710</td>
</tr>
<tr>
<td>Pasture and non-planted areas</td>
<td>1880</td>
</tr>
<tr>
<td>Total</td>
<td>5500</td>
</tr>
</tbody>
</table>

Table 5: Distribution of land uses in the Marginal Land Areas:

<table>
<thead>
<tr>
<th>Uses</th>
<th>Area (thousand duns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit trees</td>
<td>10</td>
</tr>
<tr>
<td>Vegetables</td>
<td>150</td>
</tr>
<tr>
<td>Cereals</td>
<td>60</td>
</tr>
<tr>
<td>Forests</td>
<td>10</td>
</tr>
<tr>
<td>Pasture and non-planted areas</td>
<td>9770</td>
</tr>
<tr>
<td>Total</td>
<td>10000</td>
</tr>
</tbody>
</table>

Table 6: Distribution of land uses in the Badiya Areas:

<table>
<thead>
<tr>
<th>Uses</th>
<th>Area (thousand duns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit trees</td>
<td>10</td>
</tr>
<tr>
<td>Vegetables</td>
<td>20</td>
</tr>
<tr>
<td>Cereals</td>
<td>50</td>
</tr>
<tr>
<td>Forests</td>
<td>5</td>
</tr>
<tr>
<td>Pasture and non-planted areas</td>
<td>70915</td>
</tr>
<tr>
<td>Total</td>
<td>71000</td>
</tr>
</tbody>
</table>

It has an area of about 5.5 million duns, considered the agricultural area that relies on rainwater in Jordan and it has about 700 thousand duns of forests. Land uses in High Land Areas were summarized in Table (4):

The Steppe Areas (Marginal Areas): It extends east of the mountain highlands and ranges from 700 to 1000 m above sea level. The climate of the region is generally a dry or transient climate between the Mediterranean climate and the dry desert climate, although it is more prone to drought. The annual rainfall is between 100 and 250 mm per year [11].

It has an area of about 10 million duns and it has grasses and shrubs, which considered the main pasture area in Jordan. Due to the spread of overgrazing and land misuse, the region suffers from desertification and low vegetation cover. Land uses in Marginal Areas are summarized in Table (5):

Badiya: It occupies the eastern and southeastern parts of the Kingdom. Its elevation ranges from 600 to 1750 m above sea level. There is a hot dry climate during the summer and a cold winter and the annual rainfall is less than 100 mm per year.

The area of the Badiya is about 71 million duns and occupies 80% of the area of Jordan and it is free of trees except for some desert valleys, where the spread of grasses and shrubs scattered in the depressions and valleys. The region suffers from desertification and low vegetation. Land uses in Badiya Areas are summarized in Table (6) [12]:

Plant Production Sector: This sector has an important role in the agriculture sector; since it is contribution in the national agricultural products accounts for 45 % and the animal production is 55 %; it plays an important role in the social and economic Jordan system, in addition, to it is importance in preserving the natural environment and ensure its sustainability. The Jordanian plant products are of high quality, so farmers succeeded in exporting their products for more than 40 countries. Also, the biodiversity in the topography allow farmers to produce fruits all over the year; mainly in the Jordan Valley due to the warm weather in winter, so, farmers can produce a summer crops out of season, which give farmers the ability to compete with framers in the nearer and far countries [13-15]. The total cultivated and harvested areas in Jordan in 2016 year are summarized in Table (7)
Livestock Sector: Within the Agricultural Sector Livestock is a very important in terms of investment size, employment and meeting consumer’s demand of egg, meat, milk and other products. As mentioned before, its contribution in the national agriculture product is 55 % and it provides about 56 thousands of employment opportunities in Jordan. The livestock sector total production was $ 1373.9 million in 2016; the production value of the poultry sector estimated at $ 732.4 million, which represents 53 % of the total livestock production sector. The poultry sector fulfils 87 % of the local demand of chicken meat and 100 % of table eggs in 2016. On the other hand, cattle sector provided more than 70,000 employment opportunities in 2016, with 14.3 % sharing in the livestock sector, while sheep and goat sector share with 32.2 in the livestock sector and its number is 2.275 million of sheep’s and 752.2 thousands of goats [16].

Agricultural Education: Sources of agricultural education providers with their specializations in Jordan are summarized in the following Table (8) [17].

High-School Agricultural Education aimed to:
- Preparing human resources that meet the needs of the existing and established agricultural sector, by providing students with theoretical and practical concepts.
- To prepare students academically to allow them to pursue higher education.

- Develop healthy attitudes and human values for students, such as respect for manual labor and humanitarian work, collaborative work, creativity, responsibility and dealing with environment.

Junior Colleges-diploma Education Aimed To:
- Enhancing agricultural scientific knowledge for students and providing scientific research tools.
- Establish a specialized technician to suit the requirements of the labor market.
- Linking technical education to the labor market.
- Provide the opportunity for students to complete their university studies.

B.Sc. Agricultural Education Aimed To:
- Train students to teach agricultural science and other related subjects.
- Prepare students for internal and external farm and organization works.
- Establish agricultural engineers ready to manage their own agricultural farms.
- Develop analytical skills for persons to evaluate different agricultural problem and programs [18-20].

Training Programs:
Ministry of Agriculture: Every year the Ministry of Agriculture employs and trains hundreds of agriculture engineers and technicians. In addition to their work in managing the agriculture sector, the ministry
of agriculture provide employers with specialized trainings courses to be updated with new technologies and develop their skills and training is done inside and outside Jordan with corporation of internal and external organizations like UNIDEO, NCARE…etc.

**Agricultural Engineering Association:** The responsibility of the Agricultural Engineering Association is to protect the rights of its members, in addition, to that every year, it trains about 400 engineers and help them in finding jobs and establishing their own work.

- New graduates will be subject to training programs for 6-months, with the corporation of the public sector. During this period graduates take half of their celery from the Agricultural Engineering Association, but at the end of the 6-months, the trainer should employ the graduates. About 70 % of the trainers in the program are females.
- In addition, the Agriculture Engineers do employment services, by providing job-matching opportunities for job seekers in agricultural companies inside and outside the country.
- On the other hand, there is “A Continuous Training Centre”, that provide training to all Agricultural Engineers Association members at all stages in their professional careers; training courses are chosen based on the demand of the work and individuals and the new field technologies.
- The Agricultural Engineer Association has a program, which known as “START”, it is a program that produce a fund for the Agriculture Engineers to establish their own businesses. The range of the fund is between $ 750 and $ 45,000 and granted based on a competitive process according to set criteria. Females given priority in the support [17, 20].

**CONSULTATIONS, Studies and Training Centers:** These centers are found in Universities; aimed to enhance their role in serving the local, regional and international communities by giving specialized training courses, part of their works are forwarded to the agriculture field (for farmers, High-School graduations, Junior Collage graduations, Agriculture Engineers). Training courses are applied by specialized persons like Agriculture Engineers and Universities Academic Stuff-Collages of Agriculture, trainers could be from local, regional or international sources [21].

**Agricultural Employment:** The agriculture, forestry and fishing constitute 2 % of Jordanians employed in all economic activities in the country; works differs according to the level of study as follows:

**High-school Graduations:**
- They considered as skillful-works; they work in different agricultural practices like greenhouse building, soil fumigation and preparation for plantings, irrigation, watering, spraying pesticides…etc. Other workers whom work in animal farming do dehorning, milking, cut the beaks, feeding animals and do vaccinations.
- Nevertheless, Egyptian then Indian workers dominate the agriculture sector; they are mostly unskilled and mostly men, but women work in soft agricultural practices like harvesting, sorting, grading and packaging.

**Junior Collage-Graduations:**
- They considered as Agricultural Technician, they could work at public and private agriculture sectors as a technician, like supervision of irrigation and fertilization. If they want to be an agriculture engineer they have to complete their study at the universities, then they will have the right to be a member of the Agricultural Engineers Association and can benefit from their services.

**B.Sc. Graduations:**
- Students whom will be graduated from Collages of Agriculture either from Jordan Universities or any other Universities, by law they should be registered at the Agricultural Engineers Association to attain their right to practice the profession and obtain the title of Agriculture Engineering and their number now exceeds 18,000 members.
- According to the Association, Plant Production Section form the highest percentage of Engineers followed by Animal Production Section; which is the least preferred section by females due to the difficult working conditions in animal farms.
- On the other hand, females prefer the Nutrition and Food Processing Section. Nevertheless, they fined difficulties in finding jobs, because markets cannot absorb the increasing number of the graduated nutrition females.
All of the Agricultural Engineers members are working mainly at private then at public sectors and some of them run their own business, also thousands of them are working outside Jordan (mainly at Gulf countries), in agriculture companies, food factories, pesticide factories, fertilization factories and in managing farms.

M.Sc. and Ph.D. Graduations:
- Most of them are working at Universities in teaching and in research; others are work at agricultural research stations like National Center for Agricultural Research and Extension. In addition, some of them are working at private sector mainly in research [18, 20].

Challenges in the Agriculture Sector

Workforce and Skill Development:
- Training opportunities for agricultural workers are very limited and when exist they are predominantly theoretical.
- Working in agricultural sector is not a preferred by the Jordanians because of the long working hours, instability, night shifts, high physical effort, lack of social security and health insurance. In addition, foreign labor escape from working in the agriculture sector to other sectors with better income, which lead to instability of labor and interruption of production.
- In most cases, the ownership and management of farms may not separate, which may lead to unqualified individuals assuming the responsibility of management [22].

Government Policies:
- Weak partnership between public and private sectors.
- Instability of import and export policies.
- Policies adopted by different government agencies are not harmonized and in many cases lack stability.

The Gap Between Supply and Demand in Agriculture Sector:
- The number of the establishments in the agriculture sector is about 10,200 establishments; it employs 11% of the total workers in the agriculture sector, during the next 3-5 years, it’s expected that there will be no change on the demand of its product.
- The total number of workers in the agriculture sector is about 172 thousand (79 % males and 21 % females), most of them are below high school education. And employers are preferring to employ males rather than females, because the nature of the work do not suit women’s.
- The most important problems that faces the agriculture sector is the weak marketing capabilities with 28 %, then the high prices of the production inputs with 23 %, then the taxes with 12 % and the laws and regulations that hider investment with 11 %.
- The training programs does not meet some of the professional’s requirements and this will increase the gap between the training programs and the real requirements in some careers, in addition to the low training programs of the workers, whom already working at the establishments. In addition, to the weakness of the training programs.
- During the next three years, there will be an increase in demand for the Agricultural Workers in the fields of: rearing sheep’s and cows, vegetable growing, bee keeping and poultry laying eggs….etc. And for the Agricultural Technicians in the fields of: technician of plant production, animal production. And for the Specialists in the fields of: Veterinary, plant production, animal production and fruit trees.
- During the next three years the demand for agriculture employment will reach 32 thousand’s, while the real requirements will be 9,400 employment. In the level of Specialists, the demand will be 19.8 % for the fruit trees and 11.9 % for the agricultural extension. In the Technician level, 86.4 % will be the field of plant production. While, in the level of Agriculture Workers 47.7 % of the demand will be on sheep rearing and 28.8 % in vegetable growing’s. However, for women’s the demand will be for workers in the field of milking livestock, packing and packaging.
- The unemployment expectation is about 22,600, which will be very high, so there is a large gap between supply and demand [23-26].

Recommendations:
- Forming national teams to formulate training and employment policies for the agricultural working sector.
- Review and develop training programs required in the agriculture sector.
• Canceling any unwanted training programs in the agricultural labor market.
• Identify a clear and stable policy for agricultural education in the three categories (High School, Junior Colleges and Universities), depending on demand in the agriculture sector, mainly in technicians and agriculture workers.
•Creating a participatory role for the Ministry of Agriculture and the private agricultural sector in the field of agricultural education and training and cooperation with the experimental stations in the field of training students and graduates.
• Do not allow the opening of agricultural specialists in non-agricultural colleges, in addition to lowering the accepted students in agricultural colleges mainly the females.
• Enhancing the orientation of the graduates to be job makers rather than job seekers.
• Activate the role of the private sector in the development of the agricultural sector through increasing its representation in government institutions operating in the agricultural sector.

CONCLUSION

Every year there is an increase in the number of graduators in Jordan; employment in agriculture sector is not easy, due to the limited opportunities in the Jordan markets, also graduators lack practical experience and do not have an enough training courses. Therefore, Ministry of Higher Education should limit the number of accepted students in the colleges of agriculture; also, the Ministry of Agriculture and The Agricultural Engineering Association should collaborate with each other to develop specialized training courses and in finding new opportunities and opening new markets for the graduators.

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