THE IMPACT OF EURO-MEDITERRANEAN PARTNERSHIP ON JORDAN'S AND PALESTINE'S AGRICULTURAL SECTORS FROM A WATER PERSPECTIVE: THE CASE OF HORTICULTURAL EXPORTS TO EU MARKETS

Amer S. Jabarin[*], Mohannad Sahawneh,[**]
Laith Assaf,[**] Seyfeddin Muaz[**]

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Abstract

This study aims at examining how the Euro-Mediterranean partnership would affect the strategies of the Government of Jordan and the Palestine National Authority towards developing their agricultural sectors. Two analytical tools -the Policy Analysis Matrix (PAM) and EU Market Analysis - are employed. A key message is that the export-windows and the maximum amount of allowed export quota to the EU markets stated in the EU-Med agreements should be renegotiated. Key issues investigated include the identification of the main horticultural crops that could be produced and exported from Jordan and the Palestinian Authority Territories to the EU countries without competing with EU production seasons and whether these crops efficiently utilize the limited water resources of Jordan and Palestine. The authors also look into the major economic and social implications of exporting the expected volumes of the selected crops in terms of national income (GDP), investment, employment and water.

Introduction

Economic and Trade cooperation between Jordan and the European union started in the middle of the 1970s, when the first agreement was signed between the concerned parties in 1977. Since then, the EU and the Government of Jordan have endorsed several agreements related to cooperation in the economic and technical fields as well as in the agricultural sector.
Financial grants, which have been conferred by the European Union, have had an impact on different activities and sectors of society, such as creating job opportunities, reducing unemployment and improving training opportunities.

The European Union paid special attention to the agricultural sector., by providing technical and financial grants in the field of agriculture. The protocols signed during the period 1977-1997 amounted to 59.04 million Euros paid through the European Union Bank. The agricultural sector is considered to be one of the most important sectors of the Jordanian economy. Heavy dependence on this sector warrants special effort to increase its participation in Gross National Product (GNP) and improve hard currency earning through high value horticultural exports.

The major objectives of the Government of Jordan (GoJ) are to enhance the efficiency of utilizing scarce natural resources--mainly water--increase farmers profitability and income generated by agriculture, maximize exports and value added of Jordan's agribusiness sector and the share of agriculture in GNP.

The Palestinian Authority (PA) has also set similar objectives with regard the agricultural sector. A recently prepared draft of the Palestinian agricultural strategy stated that agricultural development efforts should be focused on crops and livestock enterprises that are likely to produce the greatest private and social return per unit of land and water.

The main objective of this paper is to examine how the Euro-Mediterranean Partnership would affect the achievement of the above-mentioned GoJ and the PA objectives. Other objectives include: 1) determining the impact of the partnership on employment in Jordan and Palestine; and 2) determining the main impediments and bottlenecks to the Agreement, and its implications on the reinforcement of the Euro-Mediterranean interdependence system.

Literature Review

Limited research has been conducted on the impacts of the EU-partnership Agreement on Jordan and Palestine's economies. In this section we shed light on the literature related to this issue.

A recent study conducted by the Royal Scientific Society examined the feasibility of exporting high quality horticultural products from the Hashemite Kingdom of Jordan to markets of sufficient demand and capability to pay for such products (Ghezawi *et al*, 1997). The study proposed establishing a specialized production and marketing company to undertake the activities needed to export certain high-value crops to the Gulf and European markets. The study also concluded that the horticultural export sub-sector is facing several chronic problems due to the lack of know-how and marketing systems.

Another study entitled "Economic and Political Cooperation between the Hashemite Kingdom of Jordan and the European Union" has been recently carried out by the Institute of Diplomacy, Amman, Jordan in 1998. The study focused on the political relations between Jordan and the EU. The study also concentrated on aspects of economic cooperation between Jordan and the EU (trade balance, imports, exports, investment, etc.). The study concluded that agricultural cooperation between both parties (Jordan & the EU) be beneficial in promoting trade in agricultural products.

In their research, Jabarin and El-Habbab (1996) studied the Impacts of Trade Liberalization on the Comparative Advantage and Bilateral Trade of Cereals between Jordan and Syria by using the Policy Analysis Matrix (PAM) Approach. The researchers calculated the Domestic Resource Coefficient (DRC) and some other protection coefficients, such as the Nominal Protection Coefficient (NPC) and the Effective Protection Coefficient (EPC). The DRC coefficient was used to test whether or not the two countries enjoy a comparative advantage in producing wheat and barley under different production systems. The study concluded that there is ample room for the export of cereals from Syria to Jordan.

Jabarin and El-Habbab have also used the PAM analytical tool in 1991 and 1992 to test the impact of GoJ policies on the production of irrigated and rain-fed wheat in Jordan. They concluded that Jordan does not enjoy a comparative advantage in producing wheat under irrigated conditions in the Jordan Rift Valley and the Southern desert region. However, the country does enjoy a comparative advantage in wheat production under rain-fed conditions.

In 1989 the SRD Group used the Profitable Demand approach to estimate the market size and duration of exporting selected fresh fruits and vegetables to the EU markets. The Group produced certain booklets to help exporters explore the opportunities in the EU markets.

Jabarin *et al* (1995), have also used the Profitable Demand approach to estimate the duration and size of the marketing window for exporting seedless grapes to the UK,

France, Germany and the Netherlands. The research, which was funded by USAID, was used to prepare a business plan for exporting table grapes from Jordan. The report concluded that there is a great opportunity for exporting seedless table grapes from the Jordan Rift Valley areas during the months of May-July.

A recent study was prepared and funded by FAO/UNDP, for the Capacity Building Project in Agricultural Policy Analysis and Planning. The study focused on analyzing the comparative advantage and competitiveness of major crops and crop rotations in Palestine (FAO, 1999). The Policy Analysis Matrix (PAM) approach was used for assessing the comparative advantage of selected Palestinian agricultural products.

A country is said to have a comparative advantage in the production of a tradable good if that country's production is efficient; if not, then it has a comparative disadvantage. The concept of comparative advantage has two meanings: efficiency of production is being compared among two or more trading countries. Countries with the lowest opportunity costs are relatively more efficient and have a comparative advantage. The other meaning of comparative advantage is the efficiency of different kinds of production within the domestic economy, which are compared in terms of earnings or savings of a unit of foreign exchange[1]. The concept of opportunity cost assesses comparative advantage, by determining the opportunity cost of exchange rate, calculating the value added in border prices, and calculating the cost of domestic resources used in the production process. The domestic resource cost is compared then to the net benefits estimated at opportunity costs.

The Agricultural Sectors of Jordan and Palestine

Production of Fresh Horticultural Products in the Jordan Valley

Agricultural production in Jordan has witnessed a tremendous increase during the last three decades. Production of field crops, which are mainly wheat and barley, fluctuated during the same period from 16.9 thousand tons in 1976 to a peak of 18.6 thousand tons in 1986, and dropped to its lowest level of 2.5 thousand tons in 1979. The share of total field crops production in the JRV during 1990-94 averaged only 12 percent of total field crops in the country.

Vegetable production has tripled since 1976. This was mainly due to the expansion in irrigation projects, introduction of plastic houses, new hybrid-high yielding varieties, and increased demand for fresh produce domestically and in neighboring countries. The main vegetable crops produced in the Valley are tomatoes, cucumbers, eggplants, squash and potatoes. Production starts in early December and continues until May of the following year.

A recent report on future adjustment in the JRV concluded that the potential for increasing vegetable production base in the JRV is very promising through[2]:

1. The intensification of technology and methods used for vegetable production. Tomatoes grown in plastic houses, for example, produce 3 to 4 times the level of open field methods.
2. An increase in cropping intensity. The overall cropping intensity in the JRV fluctuated, during 1988 to 1994, from a high of 113 percent in 1991 to a low of 95 percent in 1994. This decreasing trend in cropping intensity is due to the shortage of water and low prices of traditionally grown vegetables as a result of decreasing exports to the Gulf markets. Increasing cropping intensity through planting vegetables in two or more seasons per year is possible even if the present level of water supply is maintained. Any increase in water supply may be utilized to expand cropping intensity once demand for vegetables increases.
3. Enlarging the production base capacity of vegetables through changing the cropping pattern. Bananas, for example, are consuming at present close to 17 percent of the water supply, but occupy only 16 thousand dunums (equivalent to 5.5 percent of the total JRV-irrigated area). Every dunum liberated from banana will save water that is sufficient to irrigate an average of 6 dunums of vegetables. Other fruit trees consume less water than bananas, but water liberated from each dunum of fruit tree would be sufficient to irrigate an average of 4 dunums of vegetables.

Fruit production has shown the same trend as vegetables. It has steadily increased throughout the period (1976-97), and amounting in 1997 to about twelve times the level of 1976. The most significant increase of fruit trees production in the JRV was in citrus and bananas. Citrus fruits are exported mainly to Gulf markets, while bananas are consumed locally.

The Possible Impact of Water on the Export of Fresh Fruits and Vegetables

Only 5 million dunums are cultivated of Jordan's overall area (90 million dunums = 90,000 km^2). Most of it is found in the Highlands. Rain fed agriculture represents about 4.5 million dunums, and irrigated agriculture occupies about 300 thousand dunums in the Jordan Rift Valley and 350 thousand dunums in the Highlands. There are about 90

[1] Tsakok, Isabelle, (1994).

[2] Jabarin, *et al*, (1995).

thousand farms in Jordan and about 100 thousand farmers and livestock producers. This implies that agricultural holdings in Jordan are relatively small.

Two water resources are found in Jordan: surface water and groundwater. Jordan's surface water is distributed in 15 basins. The total flow from all surface water resources in Jordan is 715 MCM, out of which the base flow constitutes about 353 MCM/year, flood flow is 332 MCM/year, and Spring flow is 255 MCM/year[3].

Groundwater is the major water resource in Jordan, and consists of both renewable and nonrenewable resources. Some renewable groundwater resources are presently exploited at maximum capacity - in some cases beyond safe yield - which is approaching the red-line limit of exploitation.

Many studies and estimates have been completed on groundwater resources in Jordan. These studies concluded that the safe yield of renewable groundwater resources is 275 MCM/year.

Several irrigation projects were implemented in Jordan since 1958, when the Government determined to divert part of the Yarmouk River water and constructed King Abdullah Canal project. The canal was 70 km long in 1961, and was extended three times between 1969 and 1987, to 110.7 km[4]. The construction of King Abdullah Canal (KAC), and its extension to the south has put more land under irrigation. During the same period the valley witnessed the construction of several dams on the side valleys, which also allowed for more new lands to come under irrigation most of which are located above the main canal and in the southern parts of the Valley.

Water demand in the region is mounting and causing lots of tension between neighboring parties. Some researchers believe that water supply in the whole region can be boosted with cheaper alternatives. Tony Allen of London's School of Oriental and African Studies said that water-stressed countries can lighten the burden by importing food to reduce water consumption for agriculture - a concept he calls "virtual water"[5]. In 1997, Jordan imported a sum of 1380 thousand tons of grains, which is equivalent in water terms, according to Tony Allen, to about 1,380 MCM. The same year, Jordan exported a sum of 380 thousand of fresh fruits and vegetables, which is equivalent to about 380 MCM of water. In other words, Jordan's trade policy in agricultural products has saved the country a sum of one billion cubic meters in terms of virtual water.

[3] Bilbeisy, M., (1992).

[4] Bani-Hani, M., (1992).

[5] Alexander, Doug, (2000).

Additional savings in terms of virtual water can be achieved once reforms related to horticultural production are put in effect. These reforms include lifting water subsidies on water in the Jordan Valley and removing the protective measures on the production of bananas, apples and grapes.

Fast population growth in Palestine and Israel accompanied with aridity is causing a water crisis.Current water use in the West Bank and Gaza Strip (WBGS) is estimated at about 286 MCM per year, with about 60 percent used for agriculture. Unless substantial improvements are made in water use efficiency and/or additional supplies of fresh water are made available, WBGS will soon face a serious water crisis.

Analysis of Marketing Problems Facing Exports of Fresh Horticultural Products from Jordan

Potential water shortages in Jordan may jeopardize agricultural production in the whole country especially in the JRV. It is clear that future agricultural and water policies must be formulated with a view towards efficient use of this scarce resource. It is the responsibility of the government to ensure that the usage of agricultural water produces the maximum economic benefit for the people of the country.

Many reports concluded that the major problems with developing an agricultural export program appear to be:

1. Failure to provide export credit;
2. Failure to provide European market information and analysis;
3. Failure to carry out appropriate applied research;
4. Failure to provide appropriate training and technical assistance in the production and marketing of a high-quality fresh produce;
5. Water quality and quantity. Many export-oriented producers in middle and south directorates who get their water needed from KAC claim that the water quality is low and it negatively affects their production in terms of exportable yields and high quality;
6. Lack of suitable varieties with export potentials such as size, shape, color, shelf life, post harvest handling, etc;
7. Lack of know-how in terms of technology and infrastructure for the growing, post-harvest handling and packaging of exportable quality fruits;
8. Lack of experience in the export industry, except on limited basis to regional markets; and
9. Lack of general agribusiness management skills.

The International Export Market of Horticultural Products

Jordan and Palestine are located at the crossroads connecting the East and the West, as well as Europe and Africa. Climatic conditions, along with the most favorable growing conditions in the different agro-ecological zones, make it ideal for producing a wide range of horticultural product, as long as there is enough quantities of good quality water.

Jordan's exports of horticultural crops reached a record number in 1982 when exports to the Gulf countries and Iraq exceeded 800 thousand tons. With declining oil revenue, an increasingly overvalued Jordanian Dinar, and heavy subsidization of fruit and vegetable production in Saudi Arabia, Jordan's export declined steadily between 1982 and 1987. The 100 percent devaluation of the dinar in 1988 produced another boom in exports of horticultural products. Total exports climbed back to 522 thousand tons in 1990. However, due to the Gulf crises, exports were almost nil during the war, and then started to climb at a slow pace to reach 380 thousand tons in 1997.

The Highlands and the JRV are the major two sources of horticultural exports. An average of 38 percent of vegetable exports was produced in the JRV during the period 1991-1995. Vegetables exported from the JRV fluctuated from one year to another, ranging from 46 percent of total exports in 1994 to a low of 30 percent in 1992.

Market Opportunities in the Arab Region

Lebanon and the Gulf countries are the major recipients of Jordanian fruits and vegetables. The main competitors in the Gulf market are Turkey, Egypt, Syria and Lebanon during certain periods of the year. Arab countries continued to be the major importers of Jordan's horticultural products during 1991-95. Vegetable exports to Arab countries originated from the JRV during 1991-95 ranged from 30 percent to 46 percent. The proportion of vegetable exports to Arab countries from the Highlands is higher than exports from the JRV (54 percent to 70 percent). On the contrary, the proportion of fruit exports from the JRV is higher than exports from the highlands. This is because; the major exported Jordanian fruits are citrus which are grown only in the JRV.

Western Europe Market Opportunities

As of January 1st 1995, the European Free Trade Association countries (EFTA) were welcomed as new members in the Union. This meant that the market size of the EU is now about 370 million rich consumers who are eager to pay high prices for fresh high quality produce especially during the cold winter season.

Western Europe is the world's largest importing region for fresh fruits and vegetables. W. Europe accounts for about 53 percent of world fruit and vegetable imports. Total European imports of fresh fruits and vegetables have been growing rapidly for the past two decades. From 1982 to 1991, the EC –12 countries imports increased by 148 percent. The EFTA countries imports also increased by about 103 percent. Clearly, the European market is the fastest- growing of all regional markets in the world.

Jordanian and Palestinian exporters will have to find seasonal market windows in which they can profitably deliver products at prevailing prices during seasons of low production within the EU. In some cases, like seedless grapes in the May-July period, there may be relatively little competition in relation to the size of the potential market. In other cases, Jordanian exporters may have to compete aggressively with other suppliers for a market already substantially saturated. In either case, the key issue is whether Jordanian exporters can achieve acceptable profit on exports to the EU market.

Eastern Europe Market Opportunities

There is a huge market for Jordanian and Palestinian horticultural products in Eastern European and former Soviet Union countries. The total population of these countries is estimated at around 435 million. Their horticultural production areas are located above 40 degrees northern latitude, and therefore it is impossible to produce sub-tropical fruits and vegetables. The growing season for currently produced crops is very short and the quality of vegetables is relatively poor. Cabbage, onions, garlic, carrots, peas and beans dominate the production pattern. Apples, grapes and plums are the most widely produced fruits. Fresh fruits and vegetables are available for only short periods of time and in areas close to production regions.

Political reform in countries like Poland, Hungary and Slovakia has brought economic growth. Private-sector marketing firms started importing fresh fruits and vegetables from "off season" production areas. Some of the Jordanian exporters have already shipped produce to these markets. Although the amount of exports is relatively small compared to the Gulf region, it is promising-- especially for exporting second grades at good prices. A strong demand for a range of products is expected to develop in these countries. The percentage share of vegetable exports from the Jordan Valley to Eastern Europe markets averaged 76 percent during the period 1991-95 which implies that the expected future increase in demand by these countries has to be met from the Valley's production.

The Palestinian Economy

Although its contribution to the Gross Domestic Product (GDP) has gradually declined over the last 30 years, agriculture plays an important role in the Palestinian economy. In 1997, agricultural value added was 6.4 percent of the GDP, compared to

13.7 percent in 1994 and 40 percent in 1968. The value of agricultural production in the WBGS amounted to US$ 786.5 million (nominal) in 1997. In both regions, the contribution of the agricultural sector to GDP is relatively greater than the manufacturing sector, which accounted for 8 percent on the average, between 1967-1994 (*Palestinian Agricultural Statistics; Israeli Quarterly Statistics*). On the other hand, this trend changed during the period 1994-1997. The contribution of the manufacturing sector to GDP was relatively greater than the agricultural sector, which accounted for 7.3 percent on the average between 1994-1997 (*National Accounts-Palestinian Statistics*).

Over the past three decades, the West Bank and the Gaza Strip (WBGS) have maintained a comparative advantage in producing and exporting vegetables, fruits, citrus and olive products. Israel and Jordan have been the two major outlets for Palestinian agricultural produce. On the other hand, the WBGS have not been self-sufficient in producing field crops and livestock products, mainly red meats and milk. On the import side, Israel has been the major supplier of food and farm products, comprising 95 percent of total agricultural imports into the WBGS (El-Jafari, 1994).

During the period 1968-1994, agricultural exports accounted for more than 25 percent of total exports. They increased from US$ 7 million in 1971 to a high of US$ 49 million in 1984, and then fell gradually to US$ 35 million in 1994 and US$ 33 million in 1997. In the GS, agricultural exports have become less important. Their contribution to total agricultural exports dropped from 75 percent in 1971 to 28 percent in 1994 and 42 percent in 1997. The value of agricultural exports increased from US$ 20.4 million in 1977 and then declined gradually to US$ 15 million in 1994 and US$ 20 in 1997. In contrast, Palestinian agricultural imports have tended to increase over time. They increased from US$ 21 million in 1971 to US$ 226 million in 1994 and US$ 600 million in 1997 (*Palestinian Foreign Trade Statistics*).

Decreases and fluctuations in agricultural exports on the one hand, and annual increases in agricultural imports on the other hand, have compounded the agricultural trade deficits several times, particularly in the WB. For example, the WB agricultural trade deficit has increased seventeen folds from US$ 8.4 million in 1970 to US$ 148 million in 1994. In contrast, the GS was a net exporter of certain agricultural produce during the period 1968–1987. After 1984 the situation changed, culminating in a large deficit of US$ 38 million in 1994 (El-Jafari, 1995).

Palestinian agricultural trade has been influenced by and subject to the political status and unsettled conditions in the Middle East. While Israeli farm products have free access to the markets of the WBGS without limitation, Palestinian agricultural exports to Israel have been regulated and restricted. Israeli officials have claimed that most of the regulations have been imposed for security reasons. Israel regularly uses security claims to justify the imposition of non-tariff barriers (NTB) and other economic measures and sanctions.

Israel has imposed several restrictions specifying the kinds of products that can be imported, the timing during which produce can be transported, and the amount of a commodity allowed to be imported. Over the past three decades, Israeli agricultural policies in the WBGS have directed and encouraged Palestinian growers to produce certain vegetables which are considered complementary to the Israeli farming and food industry. This has increased the dependency of the Palestinian economy on the Israeli (El-Jafari, 1995).

Problem Statement and Research Questions

The agriculture sector of Jordan contributed about 7 percent of Gross National Product (GNP) in 1998, which is considered to be a low percentage relative to other economic sectors. This low contribution is due to the absence of a clear agricultural policy which determines the different characteristics of the sector, the lack of management and unplanned production, scarcity of water, marketing problems, and a continuous increase in the prices of agricultural inputs.

The versatility of climatic conditions in Jordan and certain parts of the Palestinian territories gives the region special importance, as others lack the advantage of seasonal agriculture (summer and winter). Jordan's low cost of production also increases its competitiveness and its ability to enter new markets.

These factors will be inflected on socio-economic conditions for the farmers and will create stable conditions and definitely will increase its share in the national income.

This paper raises the following questions:

1. What are the main horticultural crops that can be produced and exported from Jordan and the Palestinian Territories to EU countries without competing with EU production seasons?
2. Are these crops efficiently utilizing the limited resources of Jordan and Palestine, mainly water? In other words, do these crops enjoy a comparative advantage?
3. What are the expected volumes of these crops which can be exported profitably, taking into consideration the recent steps toward market liberalization?
4. Specify (quantify) the size (depth) and the duration of the market windows for each selected crop?

5. What are the major economic and social implications of exporting the expected volumes of selected crops in terms of national income (GDP), investment, employment and water?

6. What are the implications of the Euro-Med Partnership on the Jordanian and Palestinian horticultural exports to EU countries in terms of economic and trade policies?

Based on the results of the analysis, policy recommendations to promote exports and improve the welfare of the people engaged in agricultural production in Jordan and Palestine will also include necessary adjustments by European countries to expand agricultural exchange between the three parties.

Research Methodology

Two methodologies are employed here to answer the research questions:

The Policy Analysis Matrix (PAM):

Person and Monke were the first who developed the Policy Analysis Matrix (PAM) in 1987. They described the method in a book, which was published in 1989. The PAM approach serves both as a logical framework for thinking about the effects of changes in economic and agricultural policies and as an empirical analytical tool for measuring the policy impacts. Many researchers in the region and abroad used the approach to evaluate the impacts of macroeconomic and agricultural policies. The PAM will be used here to help in answering the research question 1, 2 and 5.

EU Market Analysis Based on the Profitable Demand ^{TM} Concept

The EU Market Analysis based on the profitable demand concept will include an analysis of seasonal supply and demand in addition to an analysis of the seasonal market competition. In 1991 the SRD Group, Inc used this approach to conduct strategic market intelligence analysis. The Jordan Agricultural Marketing Development Project funded this sophisticated market research. The approach will be used here to update the analysis, which was done about a decade ago. The research will identify the market windows, the profitable demand levels for Jordan and the Palestinian Authority in addition to the expected private profit, the needed investments, employment, water and marketing facilities for a group of horticultural products.

The following section includes an elaboration of the research methods to be applied. It also shows the nature of data needed, their sources and how the results are used in answering the above research questions.

The Policy Analysis Matrix (PAM)

The Policy Analysis Matrix (PAM) will be used as the analytical tool. Private and social budgets will be built for selected crops in different agro-climatic regions. Protection and comparative advantage coefficients will be used to provide policy bids and recommendations

Economic profit is the fundamental component of the Policy Analysis Matrix (PAM) analysis. Profit is defined as the difference between the value of outputs (revenues) and the costs of all inputs (costs).

The PAM model is shown in Table 1. Private profits are defined in the first row as D=A-B-C. The letter A is used to define private revenues (the revenues at the prevailing market price). Costs are divided into two components--costs of tradable inputs and costs of domestic factors. Costs of tradable inputs (inputs which are traded in world markets) such as fertilizers, pesticides, and seeds, are included in the second column.

The value of tradable inputs at prevailing market prices (private prices) are denoted by the letter B and recorded in the first row, second column..

The third column of the matrix includes domestic factor costs of domestic factors in private prices, denoted by the letter C. Domestic factors include land, water, labor, and capital. Domestic factors are also called non-tradable inputs as there are no international markets for these inputs.

Column four in the matrix is labeled profits. Private profits, denoted by the letter D in the matrix, are included in the first row of the fourth column. Values in the fourth column are calculated by subtracting values in column two and three from the revenues in the first column. A positive difference at prevailing market prices means an excess profit exists that encourages other firms to enter the business. Positive profits also work as a stimulus for existing firms with positive profits to increase output in order to earn more profits. When more firms enter the market and existing firms expand, those two actions will induce economic growth. However, if either taxes or subsidies distort the market prices of inputs or outputs, then private profits could be a misleading indicator.

The second row of the PAM is used to calculate social profits, H=E-F-G. Social profits or ("without policy" profits) are those profits without divergences. In Table 5, the E portrays revenues valued at efficiency prices (social prices) and F and G indicate efficiency values of tradable inputs and domestic factors, respectively. Positive social profits H provide an incentive for the expansion of these activities, and result in apparent economic growth in national income.

The third row of the matrix shows the divergences or differences between the first row (private valuation) and second row (social valuation). If market failure does not exist in the product market, distorting policies causes all divergences between private and social prices of tradable output and inputs.

Policies, which may cause divergences, include subsidies, taxes and quantitative controls applied to domestic production or trade of the commodity. Pricing policies may also cause distortions.

In the third row, if the value of I is positive then private revenues exceed social revenues. This indicates that the government is subsidizing output prices. That is, the government is purchasing production at prices greater than international market prices. The value of the difference is a transfer from society (taxpayers) to producers.

If the value of I is negative, then value of the social revenues is greater than the value of private revenues. This means that the government is taxing producers. In other words, the government is purchasing production in prices lower than those prevailing in international markets. The tax in this case is a transfer from producers to society (or to the government).

The letter J represents the differences between private costs and social costs of tradable inputs. If J is negative, then private costs of tradable inputs are lower than the social costs. This means that the government is subsidizing one or more inputs such as fertilizer depicting the prices of these inputs lower than those in the international markets.

If J is positive, then private cost of inputs is greater than social costs. This indicates that the government is taxing inputs used by farmers. The net effect is that prices paid by farmers in the region are greater than world market prices.

The letter K portrays the divergences in domestic factors. The government can affect the prices of domestic factors such as capital or land. It is not uncommon for governments of developing countries to provide subsidized credit to producers as an incentive to use more capital-intensive inputs such as machinery and fertilizers. In which case, the private cost of a domestic factor may be less than the social cost, and K will have a negative value. But, if the government taxes domestic factors (which rarely happens in developing countries), the difference will be positive.

The letter L denotes the net transfer of all policies affecting the studied commodity system, L=I-J-K. If the overall impact of all policies affecting input and output prices and the exchange rate is in favor of the producer (in the short run), L will have a positive value. Alternatively, L will have a negative value, if the policies work to the detriment of the producer.

Measures of protection

Standard measures of the degree of price distortions have been estimated to compare profitability and efficiency of different crops. Ratios are an expedient approach to avoid the problem of a common numerator for comparisons among activities, particularly when the production process and outputs are dissimilar. Ratios are estimated from values of the PAM. Ratios can be used to rank alternatives according to different policy objectives. The standard measures or ratios have been calculated in the standard PAM that is, Nominal Protection Coefficients (NPC) and Effective Protection Coefficients (EPC).

Comparative advantage measure

The Domestic Resource Coefficient (DRC) is used to determine if the production of a specific crop makes efficient use of the domestic resources. The analysis of comparative advantage utilizes the Domestic Resource Cost (DRC) concept. The same set of data used above to estimate the protection coefficients can be utilized also to estimate the comparative advantage of a specific crop in a particular region.

The DRC as a measure of efficiency, or comparative advantage, is calculated by dividing factor cost G in Table 1 by the value added in social prices E-F. A DRC value greater than one indicates that the value of domestic resources used to produce the commodity is greater than the contribution of its value added at social prices. In other words, comparative disadvantage exists. A DRC value less than one indicates that the country has a comparative advantage in producing that commodity.

The PAM approach will answer the first question: What are the main horticultural crops that can be produced and exported from Jordan and the Palestinian Authority Territories to EU countries without competing with EU production seasons?. The approach is to identify crops which yield economic profits to growers and rank-order them on the basis of expected volumes of selected crops in terms of national income (GDP), investment, and employment. Estimating the economic (social) profit per unit of land (dunum) in addition to the other technical coefficients - such as the amount of required labor, capital, and water for each of the selected crops - (when combined with the results of the second approach) will allow researchers to derive the expected impact at the national level on GDP, investments, employment and water usage.

Potential unmet profitable market demand

This methodology is used to estimate the volume of unsatisfied demand in each of the destination markets (EU importing countries). Monthly profitable demand is used

here as a measure to explore the potentiality of crops selected for export to the EU market. The monthly *profitable market demand* is that quantity which is already being imported during the peak import month in the country of destination.

The above information is used to inform potential Jordanian exporters of the quantity that a particular market can absorb each week at or above prices which will give him a profit, and the depth of demand during the "marketing window" of that market. The following steps may summarize the estimation methodology of the potential unmet profitable demand:

To estimate Profitable Demand, an estimate of the average Jordanian producer/exporter "break-even" price in each export market was analyzed. The break-even price is estimated by adding up farm production costs, packaging costs, transport costs, tariffs, handling and marketing fees for supplying one kilo of fresh produce to different European markets. The break-even price is expected to differ slightly in various markets because of difference in tariff and transportation costs.

The depth or size of the market window for Jordanian products is also estimated using the weekly wholesale price data and the weekly-marketed quantities in each market.

The market analysis approach was used to help answer the third and the fourth questions " What are the expected volumes of these crops, which can be exported profitably taking into consideration the recent steps toward market liberalization?" and " Specify (quantify) the size (depth) and the duration of the market windows for each selected crop?"

The results of the two approaches, together with a review of the EU trade agreements with both countries, were used to answer the last question "What are the implications of the Euro-Med Partnership on the Jordanian and Palestinian horticultural exports to the EU countries in terms of economic and trade policies?"

Data Requirements

Budgets for the proposed crops were used to build several accounting matrices known as Policy Analysis Matrix (PAM). These matrices were designed to perform the following analysis:

1. Estimate the DRC (Domestic Resource Coefficient), NPC (Nominal Protection Coefficient) and PC (Profitability Coefficient) to show the Comparative Advantage of Jordan in producing and exporting the selected crops.

2. Estimate the private (financial) costs, revenues and net profits for the selected seventeen horticultural crops, which might be exported to Europe.

3. Estimate the social (economic) costs, revenues and net profits for the proposed crops.

To build the cost information and trade data for this analysis, the researchers updated the crop budgets from recently published reports by FAO, ESCWA, and the Ministries of Agriculture in Jordan and Palestine. The prices of the selected crops at the export markets were obtained from the EU commission database EUROSTAT.

Social valuation of outputs and inputs is a major segment in the building process of the Policy Analysis Matrix (PAM). Social prices in the PAM are also referred to as efficiency prices. Social or efficiency prices demonstrate the opportunity costs of consumption. World prices of inputs and outputs are the cornerstone for estimating efficiency prices. Social prices were calculated by adjusting international market prices for exchange rate, insurance, handling, losses, domestic marketing and transportation costs at the farm level. Different assumptions will be used for adjusting the prices of different inputs and outputs.

Results of the Analysis

The analysis covered three potential horticultural crops, which are produced in both Jordan and Palestine. The main production region at the Jordanian side is the Eastern part of the Jordan Rift Valley and in Palestine is the Gaza Strip and certain parts of the Western Jordan Rift Valley. The following section contains the results of the analysis reported in the same sequences of the research questions asked.

The first question was: What are the main horticultural crops that could be produced and exported from Jordan and the Palestinian Authority Territories to the EU countries without competing with EU production seasons? The answer to this question was obtained by reviewing the most recent work conducted in this area of study in both countries. The most recent report conducted by the FAO/UNDP (1999), revealed that strawberries, green beans, seedless table grapes, cut flowers, cherry tomatoes, cucumbers and green peppers are the main horticultural crops that can be produced and exported from Palestine especially during the winter season when the EU countries are out of production. The same crops are also considered the most potential ones for production and export from Jordan due to the close similarity in growing conditions.

The second question was: Are these crops utilizing efficiently the limited water resources of Jordan and Palestine? In other words, do these crops enjoy a comparative advantage? The answer is yes for the three selected crops in this study: strawberries, green beans and seedless table grapes. The policy analysis matrix was used to determine if the two countries enjoy a comparative advantage in the production and export of the three crops. The Domestic Resource Cost coefficient (DRC) was calculated for both countries using

private and social enterprise budgets. Social prices of output were obtained through calculating the export parity prices as shown in Tables 2 and 3. The prices are reported in Jordanian dinar per kg (JD/kg) and in new Israeli shekel (NIS/kg) for the year 1999. FOB prices were obtained from exporters in the two countries. The same methodology was used to estimate social prices for imports.

Tables 4 through 6 contain the policy analysis matrices (PAM) for the three selected crops in Jordan. While Tables 7 through 9 contains PAM for Palestine. The matrices are calculated per unit of land (dunum=0.1 hectare). It is clear from the tables that both social and private profits are positive for the selected crops in both countries. Strawberries are the leading crop in terms of profit. The last line of the table shows the impact of the public policies on revenues, cost of tradable inputs and cost of non-tradable factors of production. The divergences between private and social costs and profits are caused mainly by public policies and market failure in markets of output, inputs or resources.

Tables 10 and 11 include the indicators related to issues of competitiveness, resource use efficiency, and impact of public policy on the selected crops in Jordan and Palestine. These indicators were calculated using the crop enterprise budgets and the PAMs. It is clear from Table 10 that the selected crops have a positive value added at both private and social prices. Comparative advantage indicators - the DRC - are way below one, indicating that the three crops enjoy a great advantage in Jordan. Table grapes are the most efficient in labor allocation followed by green beans and strawberries. However, in terms of water use efficiency, green beans rank first, followed by table grapes, and then strawberries.

Table 11 shows the same indictors for Palestine. It is almost the same situation as for Jordan. Social and private profits and value added are all positive. The comparative advantage indicators - the DRC - are also far below the level indicating a great advantage in producing the three crops. Table grapes are the best in utilizing labor, followed by green beans and strawberries. They also rank first in water efficiency, followed by strawberries and green beans.

The third and the fourth research questions are answered using the concepts of market windows and profitable demand, as explained earlier in the paper. The concept of export market window opportunity means that the country can deliver the produce cheaper than any other competitor in these markets. For instance, Australia and the United States produce lots of high-quality produce, but high production and transport costs make it difficult to compete in the EU market with countries like Israel, Egypt, Palestine, Jordan and Morocco.

The Profitable Demand analysis starts with estimates of the average Jordanian and Palestinian break-even price in each export market analyzed. The break-even CIF price was estimated for the exported three crops from Jordan and Palestine to the UK market by adding up farm production costs, packaging costs, cooling and pre-cooling costs, transport costs, and handling and marketing fees for supplying one kilo of fresh produce. Marketing costs were obtained from Jordanian and Palestinian exporters specialized in exportation to EU markets. Tables 12 and 13 show the sequential steps for calculating the break-even price of Palestinian and Jordanian exports to the UK market. It is worth noticing that the break-even prices of Jordanian green beans and grapes shipped by air to the UK are cheaper than the Palestinian products. This is mainly due to lower labor and water costs in Jordan than in Palestine.

Break-even prices for both countries were then used to determine the exporting window and profitable demand in the UK market. The results of the analysis are portrayed in Figures 1 through 3. Figure 1 indicates that the total profitable demand of table grapes in the UK market is estimated at 19,973 tons if exports are made via sea. However, if exports were shipped by air, the profitable demand would decrease to about 3,370 tons. Exports by air have an advantage over those shipped by sea in terms of prices. Shipping by air is much faster and exporters can utilize those high prices at the start of the market window when prices are at their peak.

Figure 2 shows that the profitable demand of strawberries exported from Jordan and Palestine is estimated at 18,858 tons by air. Since it is a highly perishable crop, strawberries are always shipped by air. Figure 3 indicates that the profitable demand of green beans in the UK market is estimated at 12,700 tons. Green beans are also a highly perishable crop that is why they are usually exported by air. The market windows and their sizes for each of the three selected crops in the UK market are reported in Table 14.

In attempting to answer the question: What are the major economic and social implications of exporting the expected volumes of the selected crops in terms of national income (GDP), investment, employment and water; the results of our analysis indicate that if Jordan and Palestine could meet the profitable demand in the UK market alone, the following could happen: 1) farmers and exporters could gain in terms of net profits a sum of US$ 26.1 million; 2) the total value added to the national economies of the two nations would reach to about US$ 43.2 million; 3) about 2,777 new jobs will be created and 4) the needed amount of water to irrigate the required acreage would be 8.4 million cubic meters (Table 15).

Due to overexploitation of water resources to bridge the widening gap between water supplies and needs, deterioration has occurred in water quality used for irrigation. Some

of the major producers in the Jordan Valley already have started using small units on their farms to improve the quality of water through what is called “reverse osmosis”. This action increases the cost of water used in irrigation. However, the added cost is compensated through getting high-quality produce that gets high prices in export markets like the EU. Table 16 shows the possible impact of water quality deterioration on potential exports to the UK market. Water quality deterioration adversely affects the potential yields of selected crops, especially strawberries and green beans. According to the National Center of Agricultural Research and Technology Transfer (NCARTT), water quality deterioration through increasing salinity will result in adverse effects on potential yields of sensitive crops. Using the yield reduction factors estimated by NCARTT, two scenarios were simulated. If water quality shifts from the current quality (#1) to quality (#2), this will result in huge losses in total profits and in the economic value added to the economy, estimated at JD 18,003,922. However, losses will be devastating if water quality shifts to quality (#3) as shown in Table 16.

Table 17 summarizes the duration of exporting periods and the maximum quantities allowed for export to the EU free of taxes, as stated in the annexes of the Euro-Med Partnership Agreements with Jordan and Palestine. Comparing the above-mentioned results of the profitable demand analysis and the potential export windows shown in Table 14 with what is stated in the agreement, we conclude the following: 1) allowed export volumes of strawberries stated in the agreements are way below the potential profitable demand that can be exported from the two countries and 2) the allowed period for table grapes is a bit shorter than it should be. This situation leads to huge unjustified losses to producers and exporters in the two countries as well as penalizing EU consumers in terms of high prices for certain horticultural products which could be imported without competing with EU growers.

Results and Conclusions

The main results of the analysis, which were used to derive conclusions and recommend the actions needed to promote exports and improve the welfare of the people in Jordan and Palestine, are:

The agreement will have a positive economic impact on horticultural exports and in turn on employment and the national economies of Jordan and Palestine. The analysis showed that potential exports of the three studied crops could amount to 12,900, 18,858 and 12,700 tons for table grapes, strawberries and green beans, respectively.

Achieving the above-mentioned export volumes will imply generating about 2,227 new jobs and will yield a sum of US$ 43 million in value added to the economies of the two states.

Achieving the expected profitable demand will require huge investments in terms of agricultural technology transfer and managerial training;

Improvement in the production and handling technology for export purpose will have a direct benefit in terms of improving the quality of produce sold at domestic markets;

Production of the newly introduced high-value crops for export to the EU markets will force growers to comply with environmental regulations and standards in the EU, which in turn will push Jordanian and Palestinian growers to reduce their usage of chemicals. This will definitely have a positive impact on the surrounding environment, except for the additional amount of plastics used in expanding the plastic houses needed to fulfill the prospect demands. Many farmers, especially in the Jordan Valley region, have already started using the Integrated Pest Management (IPM) technique to produce exportable qualities, which implies further reduction in the usage of agricultural chemicals.

Production techniques using plastic houses utilize also the advanced techniques of irrigation. Drip irrigation technique, which is used in plastic houses, is efficient in terms of volume and distribution of irrigation waters, and in turn increases the economic returns per cubic meter of water compared to surface or sprinkler irrigation.

Small farmers could also benefit from expanding the production of these crops. Production of such crops could be achieved through what is called “satellite farming system,” which utilizes the capabilities of small farms, and in turn improves their incomes and reduces poverty levels in rural areas; and

In the long run, the Agreement creates good opportunities for regional cooperation in terms of technology transfer and utilization of supporting systems.

Recommendations

The export windows and the maximum amount of allowed export quota should be renegotiated. For instance, Jordan is allowed to export only 100 metric tons of strawberries, while the profitable demand without competing with any other EU producers is estimated at about 18,858 mt.

Additional technical assistance is needed in terms of technology transfer and vocational training to comply with the technicalities required by the EU. Such training at both local and regional level will improve the efficiency of utilizing scarce resources such as water.

Additional research is still needed, especially at the regional level. Egypt and Syria will join the partnership agreement some day in the future. We believe that it is crucial to examine the impact of the agreement on the regional cooperation collectively.

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Figure 1: Estimated Profitable Demand for Table Grapes in the UK Market

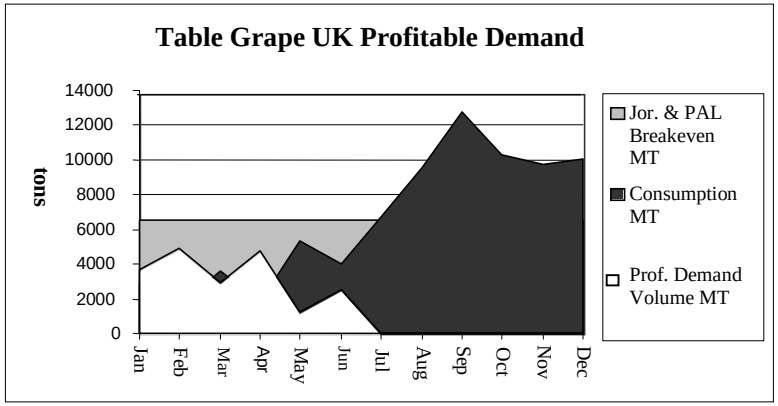

Figure 2: Estimated Profitable Demand for Strawberry in the UK Market

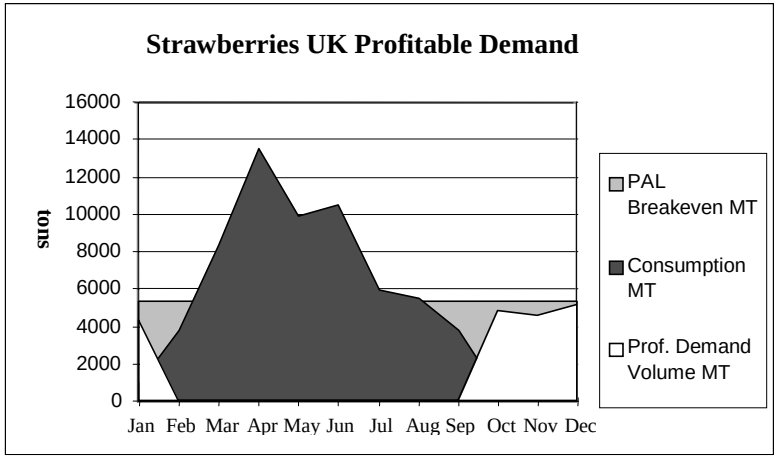

Figure 3: Estimated Profitable Demand for Green Beans in the UK Market

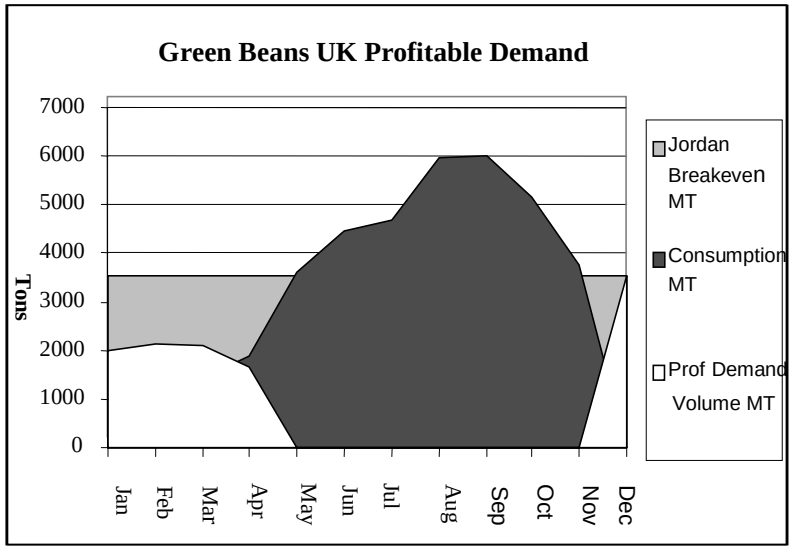

Table 1: The Policy Analysis Matrix

Item	Revenues	Costs		Profits
		Tradable Inputs	Domestic Factors	
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Policy Effects	I	J	K	L

Notes: The symbols (capital letters) of the matrix stand for: A: Total revenues in private prices (market prevailing prices-some times is called financial prices). B: Costs of tradable inputs (such as fertilizers, seeds, plastic mulch, etc.) in private prices. C: Costs of domestic factors (such as labor, capital, etc.) in private prices. D: Private profit. E: Total revenues in social prices (prices which are adjusted to government interventions). F: Costs of tradable inputs (such as fertilizers, seeds, plastic mulch, etc.) in social prices. G: Costs of domestic factors (such as labor, capital, etc.) in social prices. H: Social profit. I: Output transfers. J: Input transfers. K: Factor Transfers. L: Net transfers

Source: E. Monke and S.R. Person (1989).

Table 2: Export Parity Price for Tradable Outputs: Jordan, 1999

Item	Unit	Strawberries	Grapes	Green Beans
Exchange Rate	JD/US$	0.71	0.71	0.71
FOB Border Price	US$/ton	2000.00	2000.00	1400.00
FOB Border Price	JD/ton	1420.00	1420.00	994.00
Handling and Clearance Charges	JD/ton	15.00	15.00	15.00
Transport Cost from Packaging Center to Border	JD/ton	12.00	12.00	12.00
Price at Exporter Packaging Center	JD/ton	1393.00	1393.00	967.00
Transport from Wholesale Market to Packaging Center	JD/ton	17.00	17.00	17.00
Post Harvest Materials	JD/ton	105.00	105.00	105.00
Price of Produce at Wholesale Market	JD/ton	1271.00	1271.00	845.00
Transport Cost from Farm to Wholesale Market	JD/ton	12.00	12.00	12.00
Price at Farm-gate	JD/ton	1259.00	1259.00	833.00
Price at Farm-gate	JD/kg	1.26	1.26	0.83

Table 3: Export Parity Price, Selected Tradable Outputs: Palestine, 1999

Item	Unit	Strawberries	Grapes	Green Beans
Exchange Rate	NIS/US$	3.65	3.65	3.65
FOB Border Price	US$/ton	1470.00	2000.00	1400.00
FOB Border Price	NIS/ton	5365.50	7300.00	5110.00
Handling and Clearance Charges	NIS/ton	45.00	45.00	45.00
Transport Cost from Packaging Center to Border	NIS/ton	170.00	144.50	170.00
Price at Exporter Packaging Center	NIS/ton	5150.50	7110.50	4895.00
Certificate of Origin	NIS/ton	30.00	30.00	30.00
Transport from Wholesale Market to Packaging Center	NIS/ton	7.65	6.50	7.65
Post Harvest Labor	NIS/ton	25.00	25.00	25.00
Post Harvest Materials	NIS/ton	20.00	20.00	20.00
Price of Produce at Wholesale Market	NIS/ton	5067.85	7029.00	4812.35
Transport Cost from Farm to Wholesale Market	NIS/ton	28.90	24.75	28.90
Price at Farm-gate	NIS/ton	5038.95	7004.25	4783.45
Price at Farm-gate	NIS/kg	5.04	7.00	4.78
Adjusted Price at Farm-gate	NIS/kg	**5.38**	**7.48**	**5.11**

Table 4: Policy Analysis Matrix for Strawberries Produced in Jordan

Items	Revenues	Cost of Tradable Inputs	Cost of Domestic Factors	Profits
Private Prices (JD/du)	3750.00	1249.34	947.95	1552.71
Social Prices (JD/du)	3147.50	1008.63	1113.28	1025.60
Effects of Divergences & Policy (JD/du)	**602.50**	**240.71**	**-165.33**	**527.12**

Table 5: Policy Analysis Matrix for Green Beans Produced in Jordan

Items	Revenues	Cost of Tradable Inputs	Cost of Domestic Factors	Profits
Private Prices (JD/du)	319.30	80.15	169.68	69.47
Social Prices (JD/du)	857.99	69.73	219.68	568.58
Effects of Divergences & Policy (JD/du)	**-538.69**	**10.42**	**-50.00**	**-499.11**

Table 6: Policy Analysis Matrix for Seedless Table Grapes Produced in Jordan

Items	Revenues	Cost of Tradable Inputs	Cost of Domestic Factors	Profits
Private Prices (JD/du)	1200.00	147.11	162.50	890.39
Social Prices (JD/du)	3147.50	127.99	563.20	2456.32
Effects of Divergences & Policy (JD/du)	**-1947.50**	**19.12**	**-400.69**	**-1565.93**

Table 7: Policy Analysis Matrix for Strawberries Produced in Palestine

Items	Revenues	Cost of Tradable Inputs	Cost of Domestic Factors	Profits
Private Prices (NIS/du)	15000.00	2441.90	7413.68	5144.42
Social Prices (NIS)/du)	15000.00	2402.62	7298.36	5299.02
Effects of Divergences & Policy (NIS/du)	**0.00**	**39.28**	**115.32**	**-154.60**

Table 8: Policy Analysis Matrix for Green Beans Produced in Palestine

Items	Revenues	Cost of Tradable Inputs	Cost of Domestic Factors	Profits
Private Prices (NIS/du)	2800.00	458.50	1217.05	1124.46
Social Prices (NIS)/du)	4088.00	669.33	1185.85	2232.82
Effects of Divergences & Policy (NIS/du)	**-1288.00**	**-210.83**	**31.20**	**-1108.37**

Table 9: Policy Analysis Matrix for Seedless Table Grapes in Palestine

Items	Revenues	Cost of Tradable Inputs	Cost of Domestic Factors	Profits
Private Prices (NIS/du)	6250.00	1220.00	2471.86	2558.14
Social Prices (NIS)/du)	18700.00	1319.36	2354.03	15026.61
Effects of Divergences & Policy (NIS/du)	-12450.00	-99.36	117.83	-12468.47

Table 10: Competitiveness, Efficiency and Policy Impact Indicator for Selected Crops in Jordan

Items	Strawberry	Green Beans	Table Grapes
Private Profit (Jd)	1552.71	69.47	890.39
Social Profit (Jd)	1025.60	568.58	2456.32
Pva (A-B) (Jd)*	2500.66	239.15	1052.89
Sva (E-F) (Jd)**	2138.87	788.26	3019.51
Drc (G/E-F)***	0.52	0.28	0.19
Total Labor Requirements (Person Hr/Dunum)	710.00	90.00	125.00
Total Amount of Water Required (CM)	600.00	160.00	1260.00
Economic Profits to Labor (JD/Person Hr)	1.44	6.32	19.65
Economic Profits to Water (JD/CM)	1.71	3.55	1.95

Notes: * PVA = Private Value Added, **SVA = Social Value Added, *** DRC = Domestic Resource Ratio

Table 11: Competitiveness, Efficiency and Policy Impact Indicator for Selected Crops in Palestine

Items	Strawberry	Green Beans	Table Grapes
Private Profit (Nis)	5144.42	1124.46	2558.14
Social Profit (Nis)	5299.02	2232.82	15026.61
Pva (A-B) (Nis)*	12558.10	2341.50	5030.00
Sva (E-F) (Nis)**	12597.38	3418.67	17380.64
Drc (G/E-F)***	0.58	0.35	0.14
Total Labor Requirements (Person Hr/Dunum)	1012.00	50.00	125.00
Total Amount of Water Requried (CM)	1000.00	490.00	1160.00
Economic Profits to Labor (NIS/Person Hr)	5.24	44.66	120.21
Economic Profits to Water (NIS/CM)	5.30	4.56	12.95

Notes: * PVA = Private Value Added, **SVA = Social Value Added, *** DRC = Domestic Resource Ratio

Table 12: Calculating Break-even Price of Palestinian Exports to UK Market

Crop Budgets and FOB Prices	Green Beans	Grapes	Strawberries
Output (NIS)	2800	6250	15000
Farm gate Price (NIS)	3.5	2.5	5
Output (Ton)	800	2500	3000
Production Cost	1465	3125	5152
Water requirements	294	692	600
Seed/seedling	82	30	350
Manure - Fertilizer	50	100	250
Chemical fertilizer	191	1110	1120
'- N	60	450	75
'- P2O5	15	40	180
'- K2O	0	0	3
Microelements	10	0	10
Pesticides & Methyl Bromide	106	620	852
Mulch	105	0	900
Costs of machinery	75	80	75
Labor requirements:	45	63	355
Other Cost	623	1050	1502
'- Land rent	400	500	400
'- Depreciation (plastic, frame & drip)	57	185	127
'- Interest on working capital	166	365	975
Post harvest	1728	5400	6480
Grading, Packaging and Palletizing	480	1500	1800
Precooling	480	1500	1800
Packaging Materials & boxes	768	2400	2880
Transport to port	320	1000	1200
Transport to the port	320	1000	1200
Total Cost per Dunum (NIS)	3513	9525	12832
Palestine FOB Price NIS/Kg	4.39	3.81	4.28
Shipping Cost to UK by air @ US$ 1.00/kg	4.00	4.00	4.00
CIF price at UK market in NIS	8.39	7.81	8.28
CIF price at UK market in US$/Kg by air	2.10	1.95	2.07
CIF price at UK market in US$/Kg by sea	1.70	1.55	1.67

Table 13: Calculating Break-even Price of Jordanian Exports to UK Market

Crop Budgets and FOB Prices	Green Beans	Grapes	Strawberries
Output (JD)	319.3	1200	3750
Farm gate Price (JD)	0.31	0.48	1.5
Output (Ton)	1030	2500	2500
Production Cost	250	312	2218.5
Water requirements	2	15	7.5
Seed/seedling	20	75	800
Manure - Fertilizer	16	10	48
Chemical fertilizer	29	65	422
'- N	5	24	16
'- P2O5	4	18	54
'- K2O	0	0	3
Micro Microelements	0	0	40
Pesticides & Methyl bromide	20	23	309
Mulch	20	0	8
Costs of machinery	11	8	8
Labor requirements:	45	63	355
Other Cost	107	76	570
'- Land rent	25	32	70
'- Depreciation (plastic, frame & drip)	57	13	250
'- Interest on working capital	25	31	250
Post harvest	149.35	362.50	362.50
Facilities Rent/Return	20.60	50.00	50.00
Packaging and Palletizing	20.60	50.00	50.00
Packaging Materials	108.15	262.50	262.50
Transport to port	82.40	200.00	200.00
Transport to the port	17.51	42.50	42.50
Miscellaneous costs	64.89	157.50	157.50
Total Cost per Dunum (JD)	481.75	874.50	2781.00
Jordan FOB Price JD/Kg	0.47	0.35	1.11
Shipping Cost to UK by air @ JD 0.56/Kg)	0.56	0.56	0.56
CIF price at UK market in JD	1.03	0.91	1.67
CIF price at UK market in US$/Kg by air	1.45	1.28	2.36
CIF price at UK market in US$/Kg by sea	1.05	0.88	1.96

Table 14: Market Windows and Size for Each Selected Crop in UK Market

Crop	Market Window	Prof. Demand (tons)
Green beans	Dec-May	12,700
Strawberries	Oct-Feb	18,858
Grapes	May-July	3,370

Table 15: Expected Impact of Meeting the Profitable Demand in UK Market

Items	Strawberries	Green Beans	Table Grapes
Economic Profits (Dunum)	1026	569	2456
Economic Value Added (JD/Dunum)	2139	788	3020
Total Labor Requirements (Person hr/dunum)	710	90	125
Total Amount of Water Required (CM)	600	160	1260
Profitable Demand (tons)	18,858	12,700	3,370
Profitable Demand in terms of Acreage (Dunum)	7,543	12,700	1,348
Total Economic Profits	7,736,271	7,220,955	3,311,118
Economic Value Added (JD)	16,133,956	10,010,896	4,070,305
Total Labor Requirements (Person hr)	5,355,672	1,143,000	168,500
Total Amount of Water Required (CM)	4,525,920	2,032,000	1,698,480

Table 16: Economic Impact of Changing Water Quality on Selected Crops

Items	Strawberries	Green Beans	Table Grapes	Total
Using Water Quality # 1				
Total Economic Profits (JD)	7,736,271	7,220,955	3,311,118	18,268,344
Economic Value Added (JD)	16,133,956	10,010,896	4,070,305	30,215,157
Using Water Quality # 2				
Total Economic Profits (JD)	-6,271,640	3,734,084	2,801,978	264,422
Economic Value Added (JD)	2,126,045	6,524,024	3,561,166	12,211,235
Using Water Quality # 3				
Total Economic Profits (JD)	-14,106,573	1,990,648	2,377,695	-9,738,230
Economic Value Added (JD)	-5,708,888	4,780,589	3,136,883	2,208,583

Table 17: Summary of Allowed Exporting Period and Volumes of Selected Crops

	Jordan		Palestine	
Commodity	Allowed Period	Max. Allowed Qt	Allowed Period	Max. Allowed Qt
Strawberry	1/1-31/3	100	1/11-31/5	1200
Green Beans	1/11-30/5	Unlimted	Unlimted	Unlimted
Table Grapes	1/2-11/7	Unlimted	Unlimted	Unlimted