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Comparative Advantages of Cotton Commodity Chain

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Foreword

The Syrian economy is gradually going through in-depth transformations for the last decade with an increasing exposure to international competition. The agro-industrial sector has a critical role in this transformation due to its contribution to the GDP, employment and its potential for diversifying sources of foreign currencies earning through exportation increase. However, this transformation poses a number of challenges in particular for several strategic crops that have benefited, or are benefiting, from various levels of trade protection and government support. To what extent these crops and their related agro-industries will be able to adjust to an open economic environment? Concurrently, for other crops that have not benefited from any particular public support during the past decades, the larger integration of the Syrian Economy in the world market may provide new opportunities for expansion. However, in this case also, their actual capacity for competing with other countries exporting similar products remains an issue.

Policy makers need a comprehensive assessment of the potential impact of possible policy changes on the economic viability of these commodities. This assessment will assist policy makers in formulating the most relevant policies required to facilitate the adjustment of the agro-industrial sector and to anticipate and control any potential drawbacks on population welfare.

To this end the National Agricultural Policy Centre (NAPC), with the support of the Project GCP/SYR/006/ITA, funded by the Italian Government and executed by FAO, has carried out a systematic review of the comparative advantage of selected agricultural commodities (cotton, wheat, olive, tomato, orange and livestock) , the Comparative Advantage Study (CAS), in order to provide the necessary information for decision making.

This report presents the result for [lint cotton], while the results for the other commodity has been published in separate similar commodity reports that are available from the NAPC. A synthesis has been produced putting in perspective the status of each commodity and where the methodology applied is presented in details.

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Executive Summary

This study aims to know weather lint cotton has comparative advantage or not. In other words, is lint cotton able to enter and compete in the international market under the current policies in the country?

To answer this question, we build the Policy Analysis Matrix (PAM) to be used as an analytical framework in this study.

To build the PAM data were collected at two levels. The first is at the farm level, where two types of farms were considered according to their irrigation systems: net-irrigation and flood-well. Thus, all information related to the cost of agricultural operations was obtained. The second level is at post farm operations. thus, the costs at post harvest level (ginning) were gathered by visiting CMO and selecting a representative ginnery to all ginneries in Syria (a big ginnery).

After using the data in the PAM and analyzing it, the results showed that lint cotton does not have comparative advantage in either net-irrigation or flood-well system. However, net irrigation is closer to have comparative advantage than the latter because of the higher cost of well and pump by flood-well system.

The study recommends reconsidering the applied policies concerning prices and subsidies, using of advanced irrigation technologies, improving the performance of agricultural operations, increasing productivity, improving the the technology of current ginneries, introducing new processing technologies and processing the raw cotton domestically to increase value added and to enhance the domestic industry.

Chapter 1 - Introduction

Cotton is one of the most important strategic crops in Syria. It is the first agro-industrial crop, the second source of foreign currency after oil, and it represents about 20-30% of the overall agricultural exports of the country.

1.1. Policy issues

Some economic sources say that more than 20% of Syria's population (18 millions early 2005) depend partially or totally on cotton; cultivation, manufacturing, marketing, and other related services (Syria-online.com). Given its importance as a source of both foreign currency and raw material for the textile domestic industry, the Government is concerned to keep this crop profitable and competitive in a more open and global economic environment.

Cotton (with wheat, sugar beet and tobacco) is one of the crops that have commodity chains managed by the state. The General Organisation for Cotton Ginning and Marketing (CMO) that belongs to the Ministry of Economy and Trade (MET) is the only formal buyer of seed cotton produced in the country from licensed or unlicensed areas.

In the eighties, cotton prices were determined only according to the total costs of production plus a profit margin left to farmers. Thereafter, the price of buying cotton from producers has been determined according to the date of cotton delivery to CMO (decision of Agricultural Council), so that the base price decreases the later the cotton delivery. Therefore, three dates were determined as follows:

- 30.75 SP/kg for the delivery date from the beginning of the season to November 15.
- 26.25 SP/kg for the delivery date from November 16 to November 30.
- 19.75 SP/kg for the delivery date from November 31 to the end of the season.

The justification of the aforementioned price differentiation is to encourage farmers to the early delivery of their production in order to avoid the negative effects of unfavourable climatic conditions such as frost or rain. Nevertheless, cotton delivered in the same grade does not necessarily attain the same price because raw cotton has different specifications to meet the basic price for each grade. Currently, the class is determined by the degree of cleanness and imperfections in one unit of seedcotton. Table 1.1 shows the highest and lowest cotton prices of the season 2001/2002 according to each grade. Accordingly, most of the farmers deliver their production in the first grade, whose share was 96.36% of the total cotton delivered to the CMO in 2002, while those of the second and third grades were 3.56%, and 0.08%, respectively. Farmers sometimes have to deliver their production to the far ginneries; this implies additional costs which are compensated by the CMO as a transport subsidy.

In the past, the Government prevented any cotton produced in unlicensed areas by destroying it when detected. However, the Government has started to tolerate with farmers who plant some extra (unlicensed) areas provided that the Government will buy the production at the prevailing

world price[1]. This behaviour relied on the decision of the Ministry of Agriculture and Agrarian Reform (MAAR) No. 40 issued in 2001. Furthermore, in the last few years, the Government has started to reduce the planned (licensed) areas of cotton since cotton is a water-intensive crop and water reservation is becoming of significant concern in Syria.

Table 1.1. Cotton prices according to grades, 2002 (SP)

Grade	Item	Base price	The highest price	The lowest price
First grade	**Licensed**	30.75	31.24	24.60
	Unlicensed	14.40	14.63	11.52
Second grade	**Licensed**	26.25	26.65	20.99
	Unlicensed	12.29	12.48	9.83
Third grade	**Licensed**	19.75	20.05	15.8
	Unlicensed	9.25	9.39	7.40

Source: CMO, 2003.

The decision No.3 of the Ministers Council (MC) issued on May 2, 2001, stated that the CMO has to pay to the farmers for their delivered seed cotton just at the price equivalent to the world one (14.40 SP/kg)[2]. However, the Agricultural Cooperative Bank (ACB) will pay the difference between the equivalent world price and the official price. However, it is worth noting that the price of cotton is affected by the world price, which is distorted especially in Europe and the United States. In this regard, import of raw and lint cotton is completely banned by administrative non-tariff barriers. However, even if these barriers are removed cotton imports will be subjects to high tariffs, which can maintain the isolation of domestic production from the world market. In the past, a tax of 21.5% (9% during the delivery of raw cotton to ginneries and 12.5% by the export of lint cotton) was imposed on the cotton commodity chain, but this tax was omitted in 2000.

The price of the lint cotton, sold in the domestic markets, was determined on the basis of the costs plus a profit margin of 2%, which means that domestic prices of lint cotton are higher than those of exports (which are equivalent to the world prices). This price policy on lint cotton was a constraint to the development of the Syrian fiber yarn and textile industry. For example, in the marketing year 1999/2000 the average price for cotton fiber for the domestic market was 85.56 SP/Kg, while the average price for exports was 56.18 SP/Kg. This price policy also reduced the profitability that Syria can get from exports of garments and other textile products, given the prohibition of importing cotton yarn (Westlake, 2003).

As a response to the request of the domestic manufacturers and to encourage the domestic industry to compete at the international market, the Government issued the Decree No. 3 on May 2, 2001, which allows the CMO to sell the cotton fibre to domestic spinners at the world price plus the cost of international transportation and insurance. However, import prohibition is still in place and the equivalent price determined by the Government for the domestic market is still higher than the world price for export.

The current policy is clearly in favour of the cotton-farming producers, the estimated subsidy that farmers received is about 13.2 SP/kg. The main issue for the Government is how to increase the efficiency of the cotton commodity chain in order to facilitate the development of the textile sector while limiting the adverse effects of the liberalisation on farmers' livelihoods? In addition, to what extent can the subsidy to the farmer be reduced to allow public and private spinning mills buying lint cotton at a price lower than/equal to the international price?

[1] Decree N.40 dated 28/5/2001 .
[2] Decision N.3 of the Ministers Council (MC) issued on May 2, 2001

1.2. The place of cotton in the agriculture

In 2002, 28% of GDP[3] (at market prices) was the share of agricultural sector, and 9.8% of agricultural sector was the share of cotton production, which is equivalent to 2.7% of GDP.

The area of cotton has substantially increased during the nineties from 156 thousand hectares, in 1990, to a peak of 275 thousand hectares in 1998. This expansion of cotton area has basically been the result of an increase of the total area of irrigated land in Syria resulting from the increased use of water from the Euphrates Dam, the dams established in the early 1990s in Al-Hassakeh and the digged wells (licensed and unlicensed).

However, the recent drought, the associated shortage of irrigated water and the government orientation towards the reduction of the cotton cropped area, have forced the diminishing in the area devoted to cotton in the annual agricultural plan that the MAAR sets. This area fell from 256 thousand hectares in 2000 to about 200 thousand hectares in 2002. In this year, the total irrigated area of summer crops was about 376 thousand hectares, from which around 53% was planted with cotton. However, yield per hectare has risen substantially, from 2,979 kg/ha, in 1983, to 4,100 kg/ha, in 2001, and the production has risen from 384 thousand tons, in 1970 to more than one million tons in 2001.

The CMO currently sells about 30% of its ginned cotton to the domestic spinners and exports the remaining 70%. The priority is for the public sector in terms of quantity and quality, then to the domestic privet sector (table 1.2).

Table 1.2. The quantities and values of lint cotton sold by the CMO, 1993 - 2001

Year	Domestically Sold lint cotton ton	Value of domestically sold lint cotton 000 SP	Exports of lint cotton ton	Value of lint cotton export 000SP
1993	50,583	2,920,702	151,751	6,782,770
1994	46,643	2,667,029	188,957	9,537,430
1995	53,070	3,542,199	156,062	11,275,698
1996	62,676	4,869,384	103,059	7,806,414
1997	76,714	6,662,629	155,271	10,572,280
1998	80,689	6,792,520	195,651	12,412,330
1999	89,446	7,508,201	207,840	11,611,291
2000	107,799	8,795,591	191,206	8,665,979
2001	125,269	8,886,895	195,383	10,125,163
2002	145,296	6,119,086	259,873	9,591,696

Source: CMO.

Until 2001, Syria had occupied the eleventh place in the world in terms of annual average production (table 1.3), the second place in terms of yield per hectare (table 1.4) and the sixth place in the world in terms of export (table 1.5).

[3] In 2002, Syrian GDP was SP 924,560 million at market prices.

Table 1.3. World cotton production, 1997 - 2002 (Unit-million of 480-lb.bales)

Country	97/98	share%	98/99	share%	99/00	share%	00/01	share%	01/02	Share%
China	21.1	23.0	20.7	24.4	17.6	20.2	20.3	22.9	24.4	24.9
USA	18.8	20.5	13.9	16.4	1.7	19.5	17.2	19.4	20.3	20.7
India	12.3	13.4	12.9	15.2	12.2	14.0	10.9	12.3	11.8	12.0
Pakistan	7.2	7.8	6.3	7.4	8.6	9.9	8.2	9.2	8.2	8.4
Uzbekistan	5.2	5.7	4.6	5.4	5.2	6.0	4.4	5.0	4.9	5.0
Africa F.zone	4.3	4.7	4.0	4.7	3.9	4.5	3.2	3.6	4.6	4.7
Turkey	3.7	4.0	3.9	4.6	3.6	4.1	3.6	4.1	3.9	4.0
Brazil	1.7	1.9	2.1	2.5	3.1	3.6	4.3	4.8	3.6	3.7
Australia	3.2	3.5	3.3	3.9	3.5	4.0	3.7	4.2	3.1	3.2
Greece	1.7	1.9	1.8	2.1	2.0	2.3	2.0	2.3	2.1	2.1
Syria	**1.6**	**1.7**	**1.6**	**1.9**	**1.5**	**1.7**	**1.7**	**1.9**	**1.6**	**1.6**
Egypt	1.5	1.6	1.1	1.3	1.1	1.3	0.9	1.0	1.4	1.4
Turkmenistan	0.9	1.0	0.9	1.1	1.1	1.3	0.9	1.0	0.9	0.9
Argentina	1.4	1.5	0.9	1.1	0.6	0.7	0.7	0.8	0.3	0.3
Iran	0.6	0.7	0.6	0.7	0.6	0.7	0.7	0.8	0.6	0.6
Paraguay	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.3	0.3
others	6.2	6.8	6.1	7.2	5.6	6.4	5.5	6.2	6.1	6.2
world total	91.8		85.0		87.3		88.7		98.0	

Source: US cotton market monthly economic letter. 10 May 2002. http:/email.bharattextile.com/texstat6.php.

Table1.4. Yield of cotton fibre by country, 2001 (kg/ha)

Country	Yield per hectare
Australia	1,528
Syria	**1,414**
Turkey	1,319
China	1,096
Brazil	1,049
Spain	1,039
Greece	1,037
Mexico	1,008
Egypt	926
Kazakhstan	781
U.S.A	708
Uzbekistan	668

Source: Al-Jamaal, 2003.

Table 1.5. The main cotton exporters, 2001

Country	Exports (US$ million)	Share %
World	6253.5	100%
USA	2167.4	34.7%
Australia	1031.2	16.5%
Uzbekistan	752.0	12.0%
Greece	235.3	3.8%
Egypt	186.0	3.0%
Syria	157.0	2.5%
Brazil	154.3	2.5%

Source: FAOSTAT Database.

Chapter 2 - Description of the Commodity System

Although all cultivated cotton have to be delivered to public ginneries, about 35 thousand tons per year does not reach the CMO (4.36% in 2002). A proportion of this amount represents harvesting and post harvest losses, but the largest share of this amount is used to make some personal things like mattresses and pillows or sold to illegal small-scale ginneries.

2.1. Description of the main cropping system

About 98% of Syrian' cotton is planted in private farms, while the rest is planted in very law productivity state-farms whose total area is some 5 thousand hectares. Net irrigation systems are mainly located in Stabilisation Zone 3, 4 and 5, which consist of Deir Ezzor, Al-Raqqa, and Aleppo. However, Al-Ghab, which is located in Stabilisation Zone 1, is dominated by net irrigation system. While well irrigation systems (either flood or drip) are located in Zones 1 and 2, which consist of Hama, Homs, Idleb, and Al-Hassakeh (table 2.1).

Table 2.1. Planted area under cotton by governorate and irrigation source, 2003 (ha)

Governorate	Total area	Area planted under wells	Share of area planted under wells	Area planted under net irrigation	Share of area planted under net irrigation
Homs	923	748	81%	175	19%
Hama	5738	5164	90%	574	10%
Al-Ghab	18376	6064	33%	12312	67%
Idleb	6771	5755	85%	1016	15%
Aleppo	35357	11668	33%	23689	67%
Al-Raqqa	48401	12100	25%	36301	75%
Dair-Ezzor	24592	1721	7%	23871	93%
Al-Hassakeh	65202	58682	90%	6520	10%

Source: MAAR statistical annual abstract, 2003.

Flood irrigation scheme is dominant while the Government encourages farmers to apply water-saving systems such as drip irrigation through the provision of technical information and loans reaching an amount of SP 75 thousand per hectare (Westlake, 2001).

2.2. Marketing and processing technology

The responsibility of ginning and marketing domestically produced cotton pertains to the CMO, established in 1964. It operates in the following way:

- Purchasing the raw cotton from farmers;

- Ginning the purchased raw cotton;
- Controlling and developing the ginning mills in the whole country;
- Providing cotton to the private and public spinning mills; and
- Exporting the surplus to the international markets.

The capacity of the existing ginneries has increased over the past years. Ginning commences in late September and is completed by July or August, depending on the size of the national production. After delivering the raw cotton to the factory gate and completing weighing operations, the bags of raw cotton are unloaded to the land of the ginnery. Then a sample of raw cotton is taken from each cotton bag, to be tested by an engineer to determine its quality through examining the moisture rate and the percentage of imperfections. Then raw cotton passes through three stages: cleaning from dust, cleaning form other imperfection, and finally it needs to be dried from moisture if needed. Next, by air-drag, raw cotton is dragged to a ginning machine, which sorts it to lint cotton, seed, and wastes. Lint cotton is cleaned from dust and other wastes. After that, it is classified according to the lint length and resilience and to its trash content, pressed into bales, and stored as lint bales until the date of delivery to the buyers.

Typical ginning out-turns are as follows:

Lint cotton: 33%

Seed: 63%

Losses: 4%

Syrian cotton is of medium quality and medium staple length, which is the most common staple length produced worldwide, and it is characterised by solidity, softness, and symmetry, that help to make a successful industry. Varieties of lint cotton are standardised in all over the world, and the variety is determined with the grade and fiber length, which is measured with Inch. There are 17 grades, 6 lengths, and 86 varieties of lint cotton, each one has its own price determined daily at Liverpool Stock.

The CMO sells about 86 kinds of cotton fibre, and the characteristics of the base cotton fibre (an index) are:

- Fibre length: 13/32
- Class: 0
- Moisture: 8%

The world price for fibre increased from $ 959 per ton in August 2001 to $ 1237 per ton in February 2003.

Cotton seeds are sold to the General Establishment for Seed Multiplication (GESM) (for multiplying the seeds to sell them to cotton farmers in the following year), to oil mills, and to the international market at the world price.

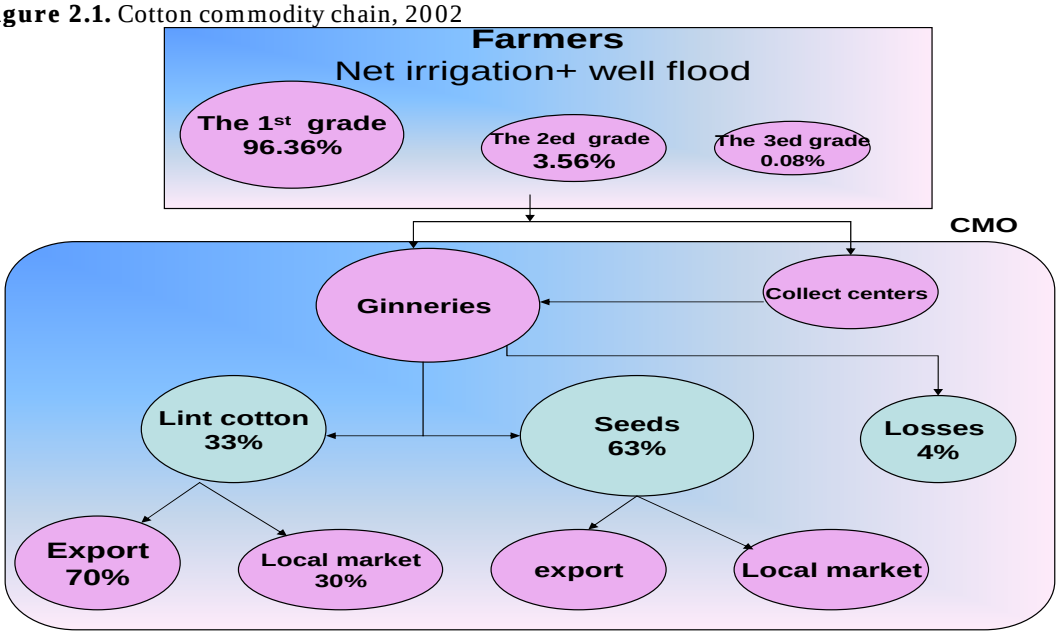
As we mentioned before, the CMO is the only buyer of raw cotton. It has 15 saw ginneries, located in Aleppo (7), Homs (4), Dair-Ezzor (1), Al-Hassakeh (1), Hama (1) Idleb (1) and Al-Raqqa (1). Cotton is Roller Ginned (RG) or Saw Ginned (SG) depending on cotton varieties and ginning characteristics. The fifteenth ginneries are different in size, capacity, and modernity, and there is a little difference among these ginneries in term of conversion rate, while the quality of lint cotton produced in the ginneries is almost the same.

2.3. Selected representative systems

The commodity chain of cotton is simple since all farmers must deliver all their production either directly to the public ginneries or to the collecting centres that, in turn, deliver the production to the ginneries. The latter occurs in the case of the long distance between the farm

and the ginnery. Next, lint cotton is either sold locally to the domestic spinners or exported. Therefore, no middlemen exist in this commodity chain as shown in figure 2.1.

Figure 2.1. Cotton commodity chain, 2002



Source: Author

Syrian cotton producers differ according to water source they use concerning their irrigation and irrigation techniques. The main water sources are public nets and private wells, while irrigation techniques are flood, sprinkler, and drip. However, the major proportion of cotton farmers currently uses flood irrigation, while the use of modern techniques is still a future alternative that is pursued by a relatively small number of cotton farmers. Therefore, the farm representative systems are two, both use flood irrigation but they are differentiated based on water source whether wells or public nets and costs, which include the costs of well digging and pumping.

Furthermore, two ginneries were chosen to be representative of all ginneries, the first represents the large and modern ginneries, and the second is the middle and old ginneries. However, the survey had shown only a little difference between the profits per unit of lint cotton. Therefore, one of them at the end was selected to study its comparative advantage.

Chapter 3 - Agent Characteristics

3.1. Source of information

Farming System Study Team (FSS) was responsible for collecting the data at the farm level through calculating the gross margins for a sample of farmers distributed within the different cotton producing areas. In addition, they calculated the fixed costs of cotton farmers from a smaller sample of farmers taking into account the discrepancies that might arise from local conditions of different areas.

Gross Margin (GM) sheet includes crop, variety, season, irrigation type (flood, sprinkle, or drip), governorate, mantika, and household type (better-off, medium, or poor). The FSS provided the data needed at the farm level. They collected these data by doing surveys in the governorates that plant cotton. First, they selected representative farms in each Mantika based upon the irrigation system, and then they made interviews with farmers to fill in the questionnaires that were prepared in advanced.

Complementary information was attained by visiting the departments of the CMO, which are the financial, marketing, and trading departments. This information is related to the trading transactions between the CMO and the importers, to general information about the ginneries used to determine how many and which ginneries should be visited and to the financial transactions between the CMO and farmers from the one side and the ACB from the other side.

Based on that, the two selected ginneries are in Aleppo since most of the ginneries are located in Aleppo, and each ginnery gave us almost all the information and the answers of the questions in the questionnaire that was prepared in advance.This questionnaire includes:

- General information.
- Identification of inputs and outputs in total production.
- Description of the process.
- Technical coefficients from raw material to outputs.
- Fixed and variable costs.

Since after the surveys many missing information were found, many documentations from the Ministry of Agriculture and Agrarian Reform (MAAR), Ministry of Economy and Trade (MET), Central Bureau for Statistics (CBS) were used in addition to some studies that had been carried out by the FAO Project GCP/SYR/006/ITA and the National Agriculture Policy Center (NAPC).

All collected data were used in a standard budget of the commodity chain for the computation of the PAM, which describes in details each agent.

3.2. Producers at farm level

Fixed costs

Fixed costs form only the cost of well drilling, since it is difficult to determine the share of each other fixed costs (mechanical equipment) that are jointly used for other cropping activities in

the farm or outside. Therefore, it is assumed that farmers hire these equipment and their capital component is inputted through the disaggregation of this value in tradable and non-tradable factors. For computing the well cost, we used the initial cost of well (271 thousand SP), and we considered that each well can irrigate 7 ha, and that the cotton mobilizes these equipment for eight month in one year. The cost related to the pump is treated as a variable cost (Agriculture water study).

After disaggregating each item into a variable and fixed part, it is important to disaggregate these parts either fixed or variable into qualified and nonqualified labor, capital, and tradable part to know the share of these items and to calculate the total value at market and social price. In this disaggregation, the share of tradable and domestic costs is also computed since they are crucial in the calculation of comparative advantage. But, it was difficult to do this disaggregation for all items, so, some of the coefficients were adopted as educated guess based on many reports and experience. For well, the fixed part of it was separated and the coefficient for it was calculated. Finally, the price of land was considered as one of the components of the total profit for each commodity chain.

Direct labour

At farm level, all labour is non-qualified, and the total labour cost for each operation per hectare was calculated taking into account the hours needed and the wage of one hour. Therefore, there is no need to disaggregate into qualified and non-qualified labor.

Intermediate inputs

Intermediate inputs include many variable inputs such as seed, fertilizer, mechanized operation...etc. For all these inputs the total value at market and social price was calculated. And as usual the disaggregation was made for all of them. For mechanized operations, the coefficients of tractor was used, which it was obtained by separating it to variable and fixed parts.

About irrigation, here it can be distiguished between two cases: if the irrigation system is flood well, then we consider the cost of irrigation is the cost of pumping of one cubic meter of water out of the well (as mentioned before), while if the irrigation system is net irrigation, only the fee that the Government imposes on the farmers is used which is about 3500 SP/hectare/year. This fee is a kind of subsidy since the cost of establishment and maintenance of the net is about 9000 SP/hectar/year. To calculate the coefficient of the pump, only the variable part of the well is considered which is the pump and its coefficients are calculated. By pumping the water out of the well, the cost of pumping of one cubic meter of water is 2.7 SP.

Examples of the budget are shown in annex 1 tables 1 (net irrigation system) and 2 (flood well irrigation system).

Figure 3.1 shows the distribution of the costs at the net irrigation cotton system at farm level. The respective shares are 44.3% non-qualified labour, 3% qualified labour, 19% capital, and 34% tradable inputs. Figure 3.2 depicts the cost distribution at the flood well irrigation cotton system. The respective shares are 39% non-qualified labour, 1% qualified labour, 32% capital and 29% tradable inputs.

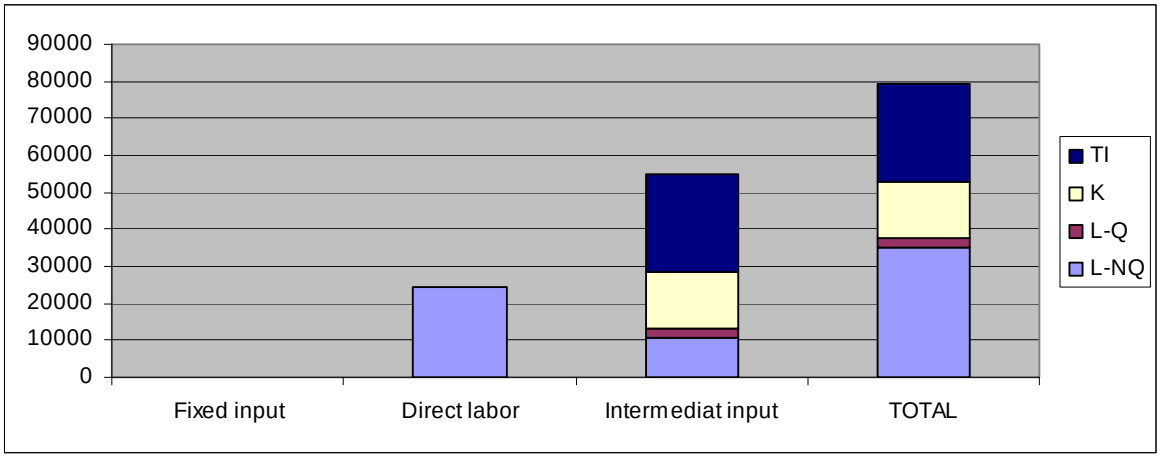
Figure 3.3 compares between the two farms in terms of cost. The cost of skilled labour in net irrigation system (2351 SP/ha) is higher than that in flood well (1107 SP/ha). However, the cost of capital in flood well (32001 SP/ha) is higher than that in net irrigation (15140 SP/ha), because of the cost of the well and the pump. Also, it can be noticed that both net irrigation and flood well have the highest cost for non tradable (52691 SP/ha and 72256 SP/ha respectively) compared with tradable inputs. This is because of the cost of well and pump for flood well and the cost of labour for both.

3.3. Processing level

The main output at processor level is lint cotton, while the by-product is seeds and little percentage of waste.

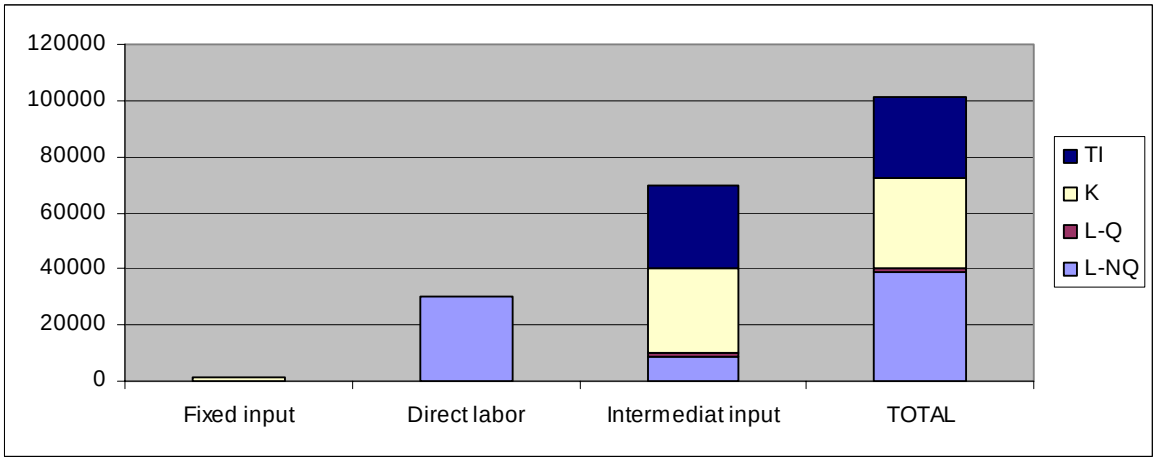
Accordingly, the budget includes the fixed inputs, prices, quantities for both direct labour and intermediate inputs and the revenues from both lint cotton and by-product. All calculations for this budget were done for one ton of the main output (lint cotton), taking into account the conversion rate of raw cotton to lint cotton (1 kg of raw cotton to 0.32 kg of lint cotton). Moreover, these calculations were done in a separate budget, then included in the PAM.

Figure 3.1. Cost of tradables and non-tradables for cotton by net irrigation**,** 2002 (SP)



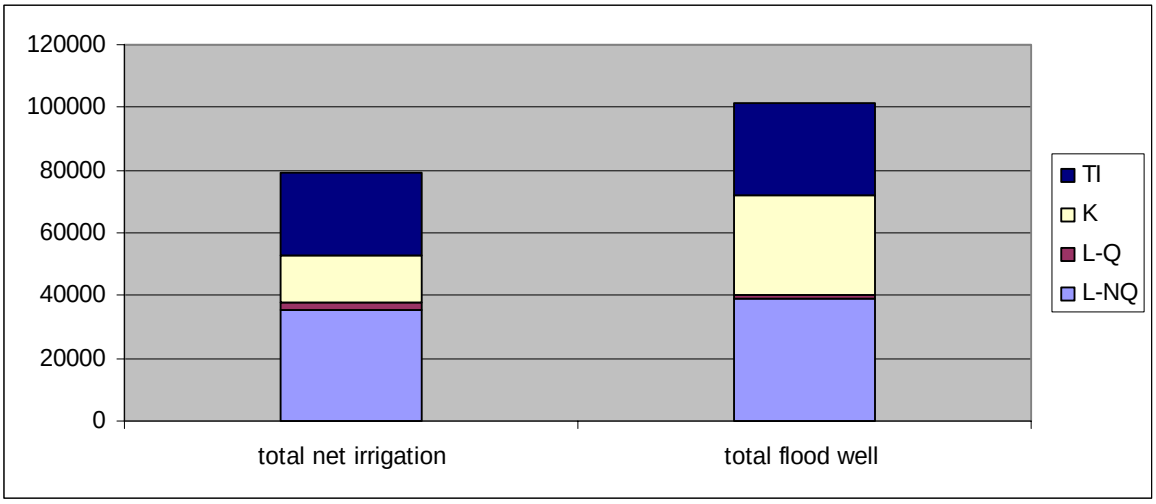
Source: Author elaboration.

Figure 3.2. Costs of tradables and non-tradables for cotton by flood well irrigation, 2002 **(SP)**



Source: Author elaboration.

Figure 3.3. Comparison between net-irrigation and flood-well irrigation systems, 2002 (SP)



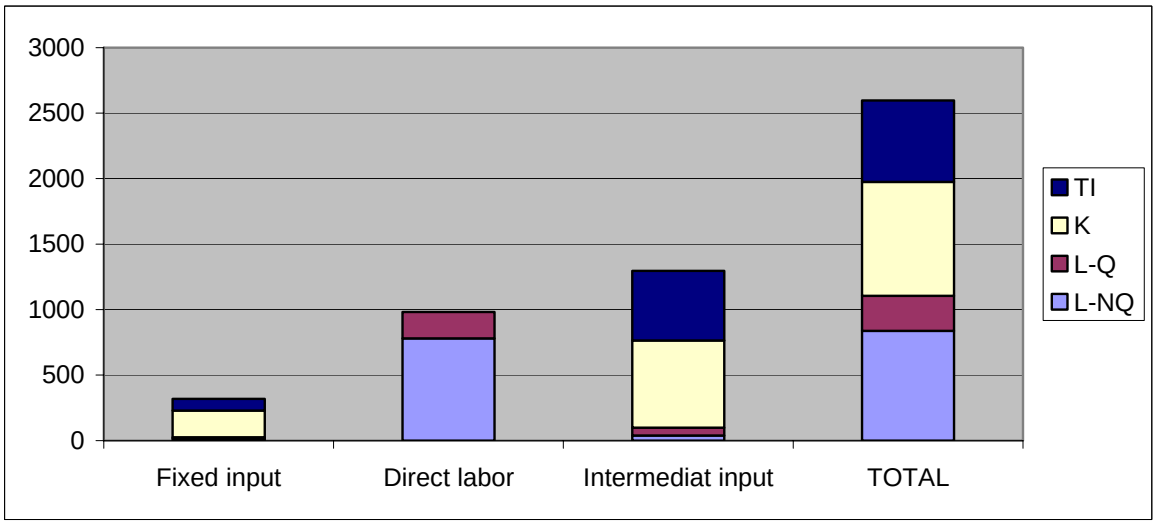
Source: Author elaboration.

All ginneries work about 9 months per year: 7 months in full capacity and 2 months in middle capacity. The rest three months are designed for maintenance. Here, it has to be distinguished between theoretical (declared) and actual (real) capacity.

Here again, as at farm level, each item either fixed or variable was disaggregated into qualified and nonqualified labor, capital, and tradable to know the shares of these parts in the item and to calculate the total value for any item at market and social price. Finally, all data used at processing level are related to season 2001-2002.

Figure 3.4 presents the distribution of the processing budget. In this regard, the shares of the various cost items are 12% fixed inputs, 38% direct labour and 49.9% intermediate inputs.

Figure 3.4. Cost distribution for cotton at processing level, 2002 (SP)



Source : Author elaboration.

Chapter 4 - Comparative Advantage of the Representative Systems

4.1. Macro economic environment

All items that are used in the calculation till now are used at market price. To continue building the PAM, the costs and values of all these items have to be known at social price.

Therefore, many hypotheses are used in this study to know the market failures to be able to calculate the social prices and to select the macro prices.

One of the aforementioned hypotheses is related to nonqualified labour, since it is seasonal, which means it is paid daily or at the end of the contract with the Government or the owner of the land. Therefore, it is not included in any kind of insurances that qualified labour does. Furthermore, its wage is almost the same at any kind of work or job. So the opportunity cost for it is equal to 1.

For qualified labour, there are many kinds of insurances that labour has to pay:

- 7% as social insurance, which the Government excludes already from the salaries.
- 14% social insurance, which company shares it with the employee.
- 3% health insurance.

For capital, there is no tax on capital. But almost for all tradable inputs, there is a tax as % on the value of CIF price. These taxes were obtained from Customs Tariff Spreadsheet by Harmonies System- 2003. Taxes were considered as positive values. On the other hand, other tradable inputs have subsidy. These subsidies were considered as negative values.

Sometimes, a part of the tradable inputs has a subsidy and a tax (tractor). This item is disaggregated into variable and fixed parts, and then the subsidies and taxes just for the variable parts were added.

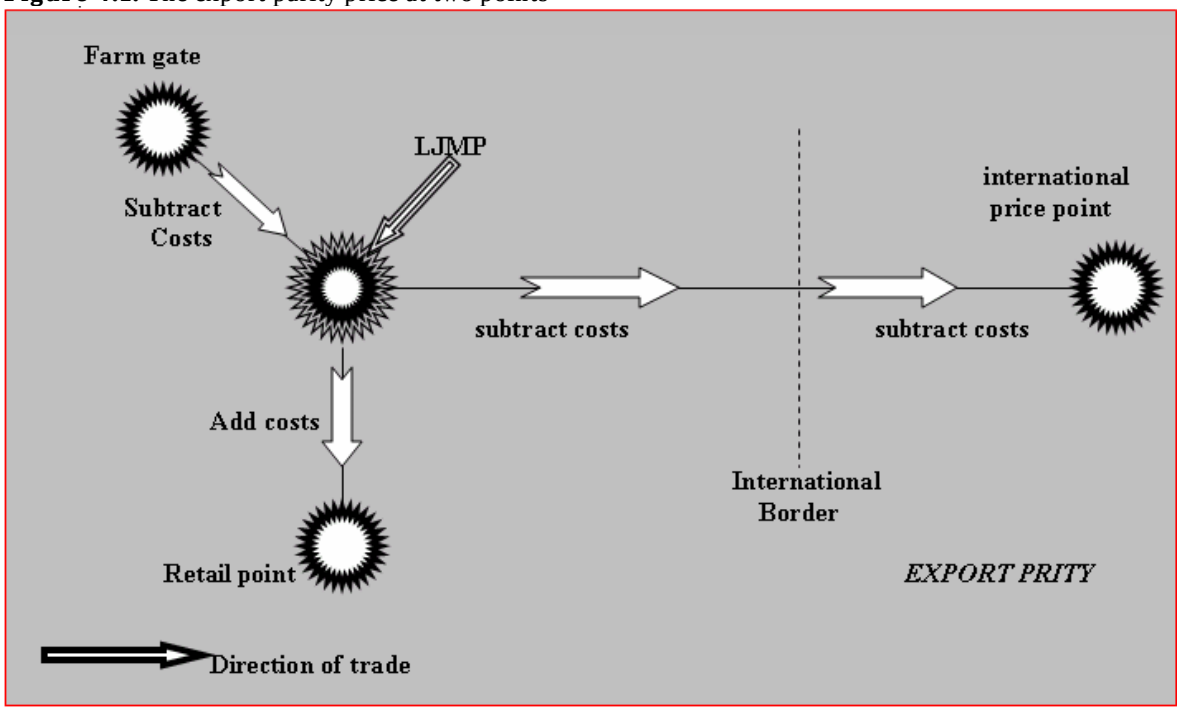
The conversion factor for exchange rate (equilibrium exchange rate (reference rate)/nominal exchange rate (market exchange rate) is equal to 1 since the two kinds of exchange rates are considered the same (51.5 SP per USD).

For all items the interest on revolving fund was calculated, which was considered 5.5% at market price, and 3% at social price (the interest rat in neighbouring countries was taken into consideration). Also, the revenues for both raw cotton and by-product were computed since the prices and quantities for both are known.

Furthermore, the concept of export parity price in this section was used as an economic indicator, where world prices represent a country's short-run opportunity cost of the commodities it produced or consumed. To calculate this price for lint cotton in Syria, the world price at C.I.F (Cost-Insurance-fright) was assessed and converted into domestic currency at the official exchange rate. This border price typically needs to be adjusted in order to bring it into

comparison with domestic prices like retail prices, land of ginning factory or farm- gate prices. For example, when adjusted to the farm gate by subtracting marketing and processing costs, the resulting world prices are called export parity price (figure 4.1).

Figure 4.1. The export parity price at two points



Source: Author elaboration.

As the figure 4.1 shows, the export parity price at two points can be compared.

- At the LJM point, which represents the land of ginning factory, where the lint cotton export parity price with the price of lint cotton obtained from the factory are compared. Thus, here, the cost of producing one kg of ginned cotton need to calculated .Then, the international price point need to be brought to the LJM point to make comparing between them.

- At the farm- gate point, where the raw cotton export parity price with the price of seed cotton are compared.

Annex table 3 depicts the methodology of calculating the export parity price.

4.2. PAM for cotton

A PAM can be considered as a way of organizing budget data on representative commodity systems. The way in which data are gathered, processed and organized, allows evaluating the impact of the set of all policies and market distortions on a given *representative commodity system*. Collecting and adding PAM's for several commodity systems can extend the analysis to the agricultural sector of a region or of the entire country. (Agricultural Policies in Developing Countries, Cafiero 2002).

Before building the PAM, two budget summary tables are established including the total cost, total revenue, and the profit at market and social price. One of these budgets uses the data as SP per ha, the second budget uses the data as SP per one ton of the main output (lint cotton). These tables depict the detailed information at farm and processing level (table 4.2).

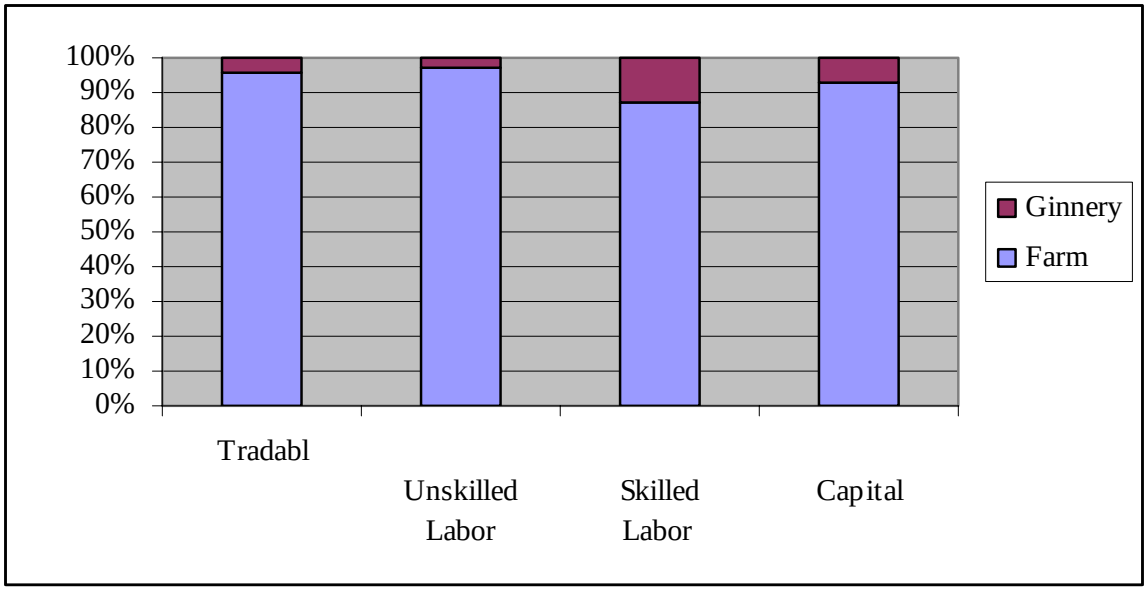
Table 4.2. Budget summary for cotton at private price, 2002 (SP)

Item	Farm	Trader budget	Processor budget	Market budget	Post farm	System
1.Total revenue	86851	41281	68049	54075	68049	113619
Main final output	41281	41281	54075	54075	54075	54075
By-products	258	0	13974	0	13974	14231
2. Total cost	65474	41281	43850	54466	44269	68462
A. Commodity in process		41281	41281	54075	41281	
(tax+, subsidy-)	-45313			0	0	-45313
B. Tradable	21990	0	621	313	934	22924
C. Domestic factors	43484	0	1975	78	2054	45538
Unskilled labor	28947	0	837	20	857	29804
Skilled labor	1933	0	268	20	287	2220
Capital	12604	0	870	39	910	13514
3. Profit before taxes	21377	0	24199	-391	23780	45157
Direct taxes	0	0	0	0	0	0
4. Profit after taxes	-23935	0	24199	-391	23808	45157

Source: Comparative Advantage Study.

Graph 4.2 illustrates that the total cost of tradable inputs forms 95.9% and 4.1% at farm and ginnery level respectively, while unskilled labour 97.1 %and 2.9%, skilled labour 87.1% and 12.9%, and capital 93.2% and 6.8%, respectively.

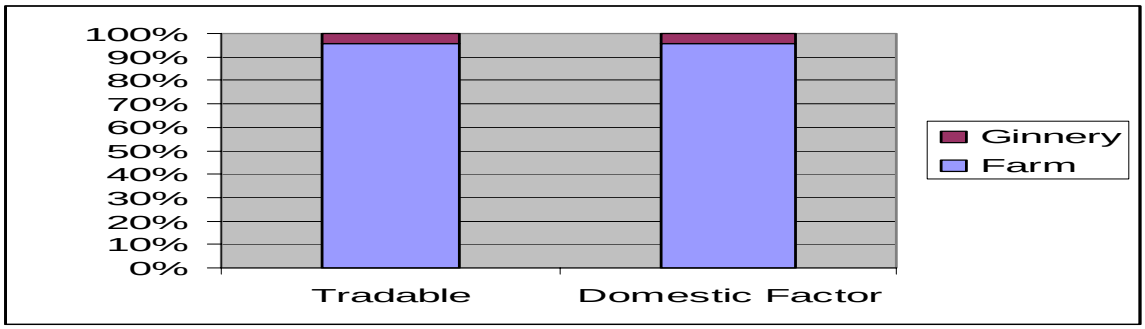
Figure 4.2. Cost distribution at farm and ginnery levels



Source: Author elaboration (CAS)

Also graph 4.3 present the shares of tradable and domestic factors at farm and ginnery levels. It illustrates that at farm level tradable inputs and domestic factors constitute a higher share than at Ginnery level, they form 95.9% and 95.5% respectively at farm, while at Ginnery level 4.1% and 4.5%, respectively.

Figure 4.3. Share of tradables and domestic factors at farm and ginnery levels, 2002



Source: Author elaboration (CAS).

Presentation of the PAM

Tables 4.3 and 4.4 present the PAM structure of cotton by irrigated network and flood well systems. Accordingly, there are typically three rows and four columns in the PAM for a representative system.

Table 4.3. The policy analysis matrix of network cotton by a large ginnery, 2002 (SP)

Item	Revenues	Costs of Tradable inputs	Domestic Factors	Profits
Private prices	A 113,619	B 22,924	C 45,538	D 45,157
Social prices	E 62,883	F 28,299	G 77,453	H -42,869
Divergence	I 50,736	J -5,375	K -31,915	L 88,026

Source: NAPC elaboration

Table 4.4. The policy analysis matrix of flood well irrigated cotton, 2002 (SP)

Item	Revenues	Costs of tradable inputs	Domestic factors	Profits
Private prices	A	B	C	D
	109,543	23,483	58,341	27,719
Social prices	E	F	G	H
	62,870	30,318	91,535	-58,983
Divergence	I	J	K	L
	46,673	-6834.56	-33193.6	86,701

Source: NAPC elaboration.

The first row of the PAM indicates the profit at market price (D) by subtracting from the revenue (A) the value of tradable inputs (B) – inputs that are subject to international trade – and the value of domestic factors –i.e labour and capital. The second row provides the same values but at social price. The third row indicates the divergences between the values at market and social prices.

If D is positive the system is profitable under the current policy and market conditions and is said to be competitive. If H is positive the system is profitable without benefiting from any

transfer (through policy or market distortions) meaning it has comparative advantage. If H is negative, it indicates that this CC is not viable under an open and liberalized competitive environment and the country would better import the good produced by this CC and reallocate its scarce domestic resources to another activity.

The third row of the PAM can answer questions whether the commodity system is subsidized or penalized. This row contains the differences between the values in the first and in the second row, which is considered as transfers (through policy or market distortions).

The private prices are the prices prevailed at current polices, whereas the social price were estimated through the computation of the parity price for the output and input based on the current tariff and tax structure or on the basis of the available international prices for similar products. For the computation of domestic factors value at social price minor adjustment is made on the labour and capital price. A particular attention is given, however, to the social cost of the water used in irrigated agriculture because it has an important impact on the performance of the CCs and because this domestic factor will be more and more scare, an thus constituting an important issue for the formulation of agricultural policy options. The method applied to find a proxy for the social value of the water was to compute the residual value of the water once all the costs (including land cost) have been deducted from the revenues of the crop and computing average unit value of water that would offset the residual profit based on the quantity of water used in each system. Thus the social price of water for a given crop was defined using the best alternative crop, i.e. the one with the lowest water unit value and that can be substituted in the cropping system.

For the revenue the parity price for the main output (lint cotton) was calculated, while the revenue of the by-product was considered the same as at market prices.

According to tables 4.3 and 4.4, the following results are presented:

The cotton sector has competitiveness under the current situation. Therefore, it can get profit about 45157 SP/ton of lint cotton. At social prices and without any distortion the profit is negative (-42869 SP/ton) which means there is no comparative advantage because of the low distorted world prices as mentioned previously, and the system needs a help from the Government to be able to compete at the international market. In terms of cost, the cost of domestic inputs is higher than the cost of tradable inputs for both private and social prices meaning that this sector is labour and capital intensive

Noticeably, positive divergences of revenues are there, which mean that the market revenue is higher than the social revenue (subsidized sector). Moreover, there is a positive divergence of tradable and non-tradable inputs which means these inputs have lower value at private price than at social price which means that the input market is also subsidized.

Overall, cell L indicates a total transfer of 88026 SP/ton and 86701 SP/ton from the economy to the lint cotton commodity chain by net and well flood irrigation systems, respectively.

Accordingly, tables 4.5 and 4.6 report the derived PAM indicators.

The indicators can be defined as follows:
Financial Profitability (FP) is a private profitability; it is an indicator, which expresses the competitiveness of the system. By net irrigation the profit is 45157 SP, while in flood well 27719 SP. Thus, it is clear that net irrigation has a higher profitability at market price than flood well and is more competitive.

Financial Cost-Benefit Ratio (FCB) compares domestic factors costs (C) to the value added at private prices (A-B). This commodity has FCB=0.5, in other word FCB<1, which means that the cost for domestic factors is less than the value added generated by the system, making it competitive. By flood well FCB =0.682 < 1 which means also this system is competitive.

Social Profitability (SP) by net irrigation is -42869 SP/ton, while by flood well -58982 SP/ton. Thus, both systems don't have comparative advantage and lose at social prices.

Table4.5. The PAM indicators of the network irrigated system by a large ginnery, 2002

1. Financial profitability (FP)	[D = A - B - C]	45,157
2. Financial cost-benefit ratio (FCB)	[C / (A - B)]	0.502
3. Social profitability (SP)	[H = E - F - G]	(42,869)
4. Domestic resource cost (DRC)	[G / (E - F)]	2.240
5. Social cost-benefit ratio (SCB)	[(F + G) / E]	1.682
6. Transfers (L)	[L = I + J + K]	88,026
7. Nominal protection coefficient (including by- product) (NPC)	[A / E]	1.807
7a. Nominal protection coefficient (main final output only) (NPC*)	[A* / E*]	2.043
8. Effective protection coefficient (EPC)	[(A - B) / (E - F)]	2.622
9. Profitability coefficient (PC)	[D / H]	-1.053
10. Producers subsidy ratio (PSR)	[L / E]	1.400
11. Equiv. producer subsidy (EPS)	[L / A]	0.775

Source: NAPC elaboration.

Table4.6. The PAM indicators of the flood well irrigated cotton system, 2002

1. Financial profitability	[D = A - B - C]	27719
2. Financial cost-benefit ratio	[C / (A - B)]	0.6779
3. Social profitability	[H = E - F - G]	-58982
4. Domestic resource cost	[G / (E - F)]	2.8119
5. Social cost-benefit ratio	[(F + G) / E]	1.9382
6. Transfers	[L = I + J + K]	86701
7. Nominal protection coefficient(including by pro.)	[A / E]	1.7424
7a. Nominal protection coefficient(main final output only)	[A* / E*]	1.9593
8. Effective protection coefficient	[(A - B) / (E - F)]	2.6437
9. Profitability coefficient	[D / H]	-0.47
10. Producers subsidy ratio	[L / E]	1.379
11. Equiv. producer subsidy	[L / A]	0.7915

Source: NAPC elaboration.

Domestic Resource Cost (DRC) indicates the comparative advantage of the system. it compares the social cost of using domestic recourses (G) with the social value added generated by the system (E-F). If DRC>1, the system has no comparative advantage (this is our case for lint cotton). Thus the opportunity cost of using domestic resources exceeds the value added at world price, in another word, it is better to import the good. DRC by net irrigation is 2.24, while by flood well 2.81.

Social Cost-Benefit Ratio (SCB) takes into account the whole cost of production (F+G), and it is better to be used by comparing two commodity systems. By net and flood well irrigation it equals to 1.682 and 1.938 respectively, indicating that the net irrigation system has better performance than the flood well.

Transfers (L) are 88026 SP/ton and 86701 SP/ton by flood well, respectively which means that flood well has more distortion than net irrigation.

Nominal Protection Coefficient (Including by-product) (NPC) is the ratio of revenues in domestic prices and revenues in world prices, which means the relative protection for the system. NPC is equal to 1.807 and 1.742 by net and flood well irrigation systems, respectively indicating a level of protection by 81% and 74% higher than the world price, respectively.

Effective Protection Coefficient (EPC) compares the value added at private and social prices indicating the total level of protection taking into account the effect of policies on the private values of tradable outputs and tradable inputs. The EPC is equal to 2.622 and 2.644 for net and well flood irrigation systems respectively, indicating the total level of protection is less by net than by well flood irrigation system.

Producers Subsidy Ratio (PSR) shows the share of the net transfers to the social revenues of the system. If it is positive, this net transfer to the system (1.4) is coming from the society not from the efficiency of the sector itself. In another word, the net work irrigated system as well as flood well system are subsidized by 0.4 of social revenue.

Equiv. Producer Subsidy (EPS) has the same meaning as the previous indicator, but for private revenue. In other word, the producer receives 22% more revenue as subsidy for both systems.

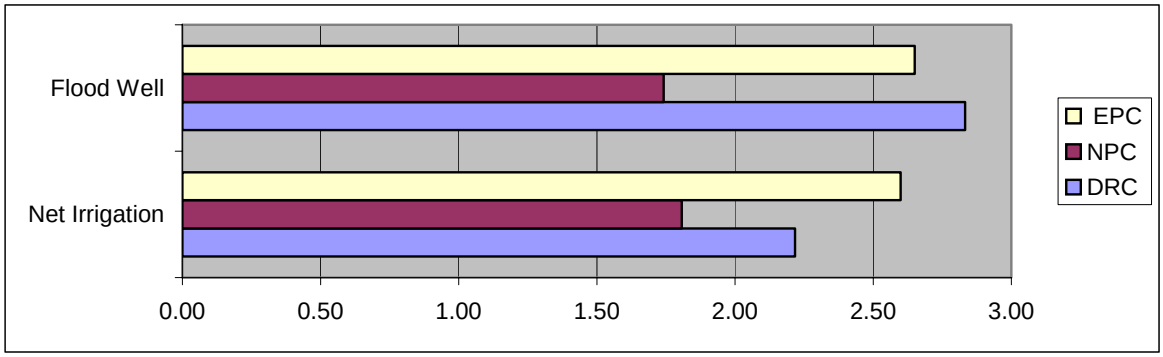
To compare the two systems, the table 4.7 and figure 4.4 compare between these 2 systems.

Table 4.7. Summery table of the main indicators**, 2002**

Item	DRC	NPC	EPC
Net Irrigation	2.40	1.80	2.62
Flood Well	2.81	1.74	2.64

Source: Author elaboration.

Figure 4.4. Comparison of the main indicators for lint cotton by network &flood well system, 2002



Source: Author elaboration.

4.3. Factors determining the comparative advantage

The construction of the PAMs relies on the collection of primary and secondary data combined with a number of hypotheses made with regard to the value of parity prices for tradable outputs and macro-economic aggregates such as exchange rate, interest rate and prevailing distortions on domestic factors markets. It is therefore necessary to look at the effects on the PAM's results concerning the variations of the prices in order to check to what extent these results are robust enough to be referred to in the decision making. Furthermore, several variables of the PAM vary across the years; this is particularly the case for yields that are affected by climatic conditions and for the world market prices of agricultural commodities and derived processed products which vary according to the changes in demand and supply across the world. Thus, beyond the uncertainty of the estimation of several costs and prices inputted in the PAM, it is also necessary to look at the effect of the instability of these important parameters such as yields and parity prices on the PAM indicators (sensitivity analysis). The indicators that can be taken as references in the sensitivity analysis are:

- Financial cost-benefit ratio (FCB).
- Domestic resource cost (DRC).
- Social cost-benefit ratio (SCB).
- Effective protection coefficient (EPC).
- Producers subsidy ratio (PSR).

While the variables that affect the PAM's results and are used in sensitivity analysis are:

- Yield.
- Conversion rate from raw material to main output at processing level.
- Exchange rate.
- Parity price for the main output.

By using Excel program and computing the linear elasticity (E) of the PAM variable to the selected variable the sensitivity can be assessed.

Results:

Yield

The relationship between yield and the five indicators is negative, which means that when the yield increases by one unit these indicators decrease by E. DRC is the most effected indicators with yield. The E for it is -1.28, and this is a normal result because the increase of yield up to a determined level will increase the revenue with a percentage higher than the percentage of the increase in the cost, so DRC will decrease and become one which means having a comparative advantage. On the othe hand, yield has little effect on PSR, E for it is -0.35. SCB, FCB, and EPC will decrease by 0.64, 0.81 and 0.70 respectively, so the yield has a moderate effect on them.

Conversion rate

Its relationship with the PAM indicators is also negative. This variable has substantial effect on DRC. Thus, when the conversion rate increases by one unit the DRC decreases by 0.64. The same interpretation as mentioned above can be applied. When this ratio increases up to a determined level, DRC will decrease to improve the comparative advantage. This can be achieved by using modern technology and modern ginneries that can increase the conversion rate. On the other indicators, the conversion rate has a middle effect. E for these indicators is as the following: -0.33 for FCB, -0.40 for SCB, -0.47 for EPC, and -0.37 for PSR.

Exchange rate (ER)

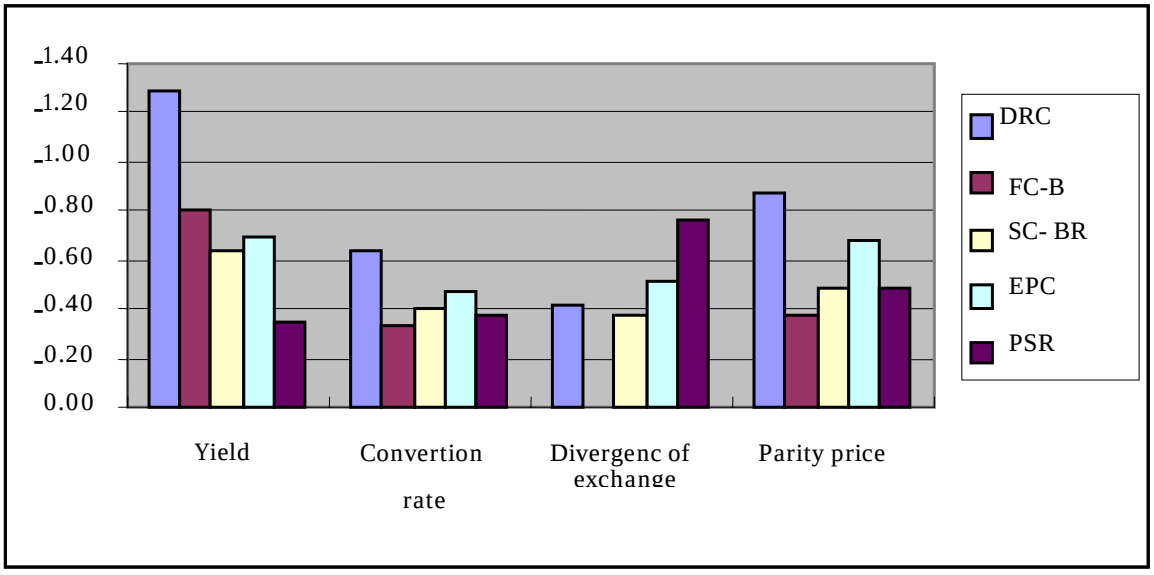
This variable affects negatively only the indicators that are related to social market, in other words, it has no effect on FCB. When the exchange rate increases by one unit, the indicators decrease by the following: 0.43 for DRC, 0.38 for SCB, 0.51 for EPC, and 0.76 for PSR. It is clear that PSR is the most affected with the exchange rate, because when ER increases, the local currency (SP) will become devaluated encouraging traders and processors to buy the output from the local market and not to import it. In this case, also EPC is affected by ER. DRC is also affected with this variable; when the conversion rate (ER) increases to 1.05, DRC will become 0.98 achieving comparative advantage for lint cotton.

Parity price for the main output

This variable has little effect on FCB. When the parity price increases by one unit, the indicators decrease by the following: 0.86 for DRC, 0.38 for FCB, 0.49 for SCB, 0.67 for EPC, and 0.48 for PSR. Thus, comparative advantage for lint cotton can be achieved, if the parity price increases from 1000 USD to 2000 USD, and DRC will be 0.9. Also, this variable has a substantial influence on PSR and EPC.

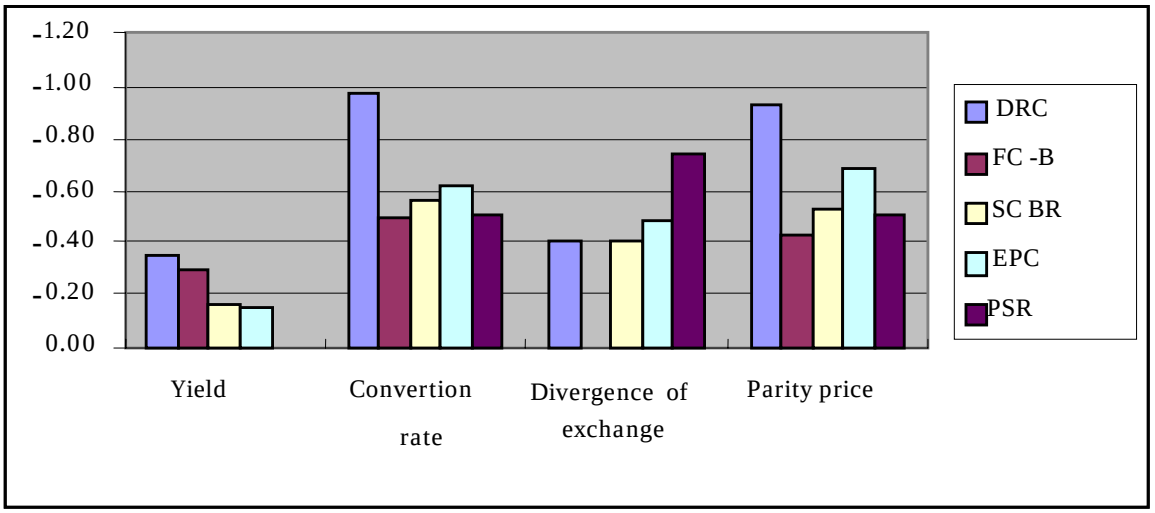
Figures 4.5 and 4.6 summarize the relationship between the selected variables and the most affected indicators of the net and flood well irrigated systems. The break-even point is attained when DRC = 1. Table 4.8 compares between the indicators of the same systems. Accordingly, as the yield of the two systems increases, both DRC and FCB improve towards comparative advantage.

Figure 4.5. Sensitivity analysis for cotton by net irrigation, 2002



Source: Author elaboration

Figure 4.6. Sensitivity analysis for cotton by flood well irrigation, 2002



Source: Author elaboration

Table 4.8. Comparison between the indicators of cotton by net and flood-well irrigation systems, 2002

Net irrigation			**Flood well**		
Yield	**DRC**	**FCB**	**Yield**	**DRC**	**FCB**
2.45	5.63	0.84	3.5	3.01	0.72
2.70	4.34	0.74	3.75	2.91	0.70
2.95	3.54	0.66	4.00	2.83	0.68
3.20	3.00	0.60	4.25	2.76	0.67
3.50	2.55	0.55	4.50	2.71	0.66

Source: Author elaboration

Chapter 5 - Conclusions and Recommendations

Results:

1. This study gives a proved result that currently Lint cotton has no comparative advantage in Syria due to exporting of about two third of domestic production because of the inability of local ginneries of processing the entire local production to benefit of the added value, which enforces Syria to sell a substantial part of its production as a raw material, to sharp diminishing of world prices as a result of excess supply of the product and to distorting of world prices because of the great support of the producing countries especially the United States and Europe. Many other reasons participated in this result, such as costs, yield, limited domestic resources especially water resources, pricing policies, macro-economic environment and others.
2. Lint cotton is a very important product in the world, and has an economic power to countries that produce it especially if it has a high quality. Syrian lint cotton is strongly desired and has the quality that most of the world wants, so it is urgent to improve the comparative advantage of it.
3. Two systems were studied, after classifying them according to the irrigation system, namely: net irrigation and flood well. The conclusion, after calculations and analyses, is that net irrigation is somehow better than flood well in terms of comparative advantage.
4. The demand for Syrian lint cotton increased from 151751 tons in 1993 to 259873 tons in 2002, which gives an indication about its importance. But one of the problems that face lint cotton is the competition of foreign lint cotton that has the same characteristics of Syrian lint cotton especially Turkish, Greek, and American. Besides, some large produced countries like USA interfere to decrease the price of lint cotton; for example, in recent years the American support for cotton varied between 3.5$ billions and 4$ billions for 25 thousand farmers, which enforced the producing countries to complain by the WTO.
5. The costs of harvesting, wedding and irrigation constitute a high share of the total costs. Therefore, it is necessary to take actions concerning the cost reduction in general and the decrease of these costs in particular.
6. In terms of yield, the comparative advantage can be also improved, if the yield increases up to 5 ton /ha.
7. Conversion ratio also plays a substantial role in in improving the comparative advantage, if the country introduces new and modern machines that have a conversion rate higher than 0.32 and less waste.

Recommendations:

Many procedures may help to overcome the obstructers that face the cotton sector and prevent it of having comparative advantage:

1. Continuing with the pricing policy of the three grades to enhance early planting and harvesting in order to improve the quality of the final product.
2. The subsidized price for raw cotton will cause an increase in the cost of cotton ginning and the level of debts for CMO, leading to a decline in the ability of competitiveness with foreign lint cotton. The alternative solution is to market the cotton based on the world price and to provide the support for producers as direct decoupled payments by establishing special funds for subsidies. In this case, the international competitiveness of local industries will rise, and gradually this matter will reduce the export of lint cotton while the export of yarns, textiles and clothes will increase.
3. Since the cost of water forms a high percentage of the total cost, so this study suggests using the modern irrigation systems (sprinkle, drip, and leveling by laser).The technical and economic studies show that there is an increase in the modern irrigation systems because of water saving (38% for sprinkle, and 58% for drip) and the yield increase (31 % for sprinkle, and 35% for drip); (Some .G 2001).
4. This study suggests improving the performance of agricultural operations by using machinery by almost al of these operations especially by leveling, sowing, weeding, and picking up the cotton. These machines will reduce the cost of production.
5. There is an urgent need to increase the yield to be able to have comparative advantage; this can be done by many ways:
    - Conducting more research to elicit new varieties that have high yield.
    - Encouraging the farmers to plant the varieties of cotton in the predetermined suitable areas.
    - Enhancing the farmers to follow precisely the instructions of planting, irrigating, fertilizing, and all agricultural operation.
    - Improving the ginneries: so, it is important to develop the ginneries by using new machines to increase the conversion rate. Employing skilled workers and strict monitoring on the ginning operations will raise the profits and improve the characteristics of lint cotton.
    - Concentrating on spilling and milling the lint cotton instead of export it to increase the value added. These data may give us many important indicators:
        i. Export of lint cotton will give an average value of 1400-1800$/ton.
        ii. Export of good yarns will give an average value of 2600-3600$/ton.
        iii. Export of good textiles will give an average value of 5000-6000$/ton.
        iv. Export cotton as clothes in all forms will give an average value of 8000-15000$/ton.

      This means that substantial extra gains can be obtained by exporting cotton as yarn, textile, and clothes. Besides, this matter will provide many new job opportunities.

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Annexes

Annex 1: Tables

Table 1. Example of the budget for net irrigation system

	-------- TOTAL ANNUAL CAPITAL COST---------					TOTAL
B1. FIXED INPUT	Life-Time	Used up Value	Initial Cost			Market Price
		1	0			0
		1	0			0
TOTAL						0
BUDGET #1 - FARM LEVEL						TOTAL
B1. DIRECT LABOR		Unit	Price	Quantity	Freq	Price
Land preparation		hours	32	5	1	156
Levelling		hours	35	0	1	8
Other		hours		0	1	0
Sowing & planting		hours	17	50	1	862
Fertilization		hours	25	11	1	266
Chemicals		hours	45	1	1	42
Irrigation		hours	24	122	1	2935
Weeding		hours	21	230	1	4902
Harvesting		hours	25	597	1	14810
Post-harvesting		hours	91	4	1	332
			0	0	0	0
TOTAL					1019.331	24313
BUDGET #1 - FARM LEVEL						TOTAL
		---------- Budget information ----------				Market
B1. INTERMEDIATE INPUT		Unit	Price	Quantity	Freq	Price
Seed/Seedling		kg	12	154.5	1	1810
Manure		kg	650	0.2	1	111
Chemical fertilizers:		kg		0.0	1	0
Nitrogen		kg	12	584.9	1	6857
Phosphate		kg	9	206.2	1	1864
Potash		kg	12	6.8	1	83
Other (liquid)		kg	12	20.2	1	250
Chemicals:		kg		0.0	1	0
Pesticides		kg	681	0.8	1	525
Herbicides		kg	528	1.8	1	930
Fungicides		kg	85	0.9	1	77
Machinery:					1	0
Tillage		Hours	274	8.08	1	2215
Leveling		Hours	280	3.84	1	1075
Other		Hours	312	0.66	1	207
Sowing & planting		Hours	225	0.62	1	140
Fertilizer appl. 1		Hours	248	31.33	1	7782
Fertilizer appl. 2		Hours			1	0
Fertilizer appl. 3		Hours			1	0
Manure application		Hours	500	0.30	1	152
Herbicide application		Hours	83	5.27	1	435
Insecticide application		Hours	187	0.36	1	68
Harvesting		Hours	1,250	0.07	1	89
Packing and loading		Hours	375	0.12	1	45
Transport costs		Hours	730	15.00	1	10950
Animal Draft		Day	78	0.58	1	46
Packing		SP	84	24.23	1	2040
Transport		SP	575	8.81	1	5064
Water Requirements					1	0
Irrigation 1		fee/hectar	3,500	1	1	3500
Water value		SP/cm	3	11,500.00	1	0
Land rent		SP/HA	7,577	1.00	1	7577
Other1			121	1.53	1	184
Other2			6	0.30	1	2
			0	0	0	0
Interest: on Revolving Fund		*at market*	5.5%	28356	0.67	1040
		at social	3.0%	43272	0.67	0
TOTAL			*rate*	*amount*	*year*	55117
BUDGET #1 - FARM LEVEL						TOTAL

B1. REVENUES	Unit	Price	Quantity	Market
raw cotton	ton	13210	3.8	50198
by product	kg	80	3.9	313
				0
TOTAL REVENUES				50511
TOTAL COST				79430
PROFIT (BEFORE TAXES)				-28919

Table 2. Example of the budget for flood well system

	-------- TOTAL ANNUAL CAPITAL COST---------					TOTAL
B1. FIXED INPUT	Life-Time	Used up Value	Initial Cost			Market Price
Well of 50 m depth	50	0.09	271000			1494
		1	0			0
TOTAL						1494

BUDGET #1 - FARM LEVEL B1. DIRECT LABOR	Unit	Price	Quantity	Freq	TOTAL Price
Land preparation	hours	50	4.7	1	233
Levelling	hours	66	0.9	1	62
Other	hours	70	0.6	1	44
Sowing & planting	hours	20	58.3	1	1153
Fertilization	hours	44	8.5	1	370
Chemicals	hours	50	0.6	1	31
Irrigation	hours	31	130.9	1	4024
Weeding	hours	24	197.8	1	4694
Harvesting	hours	27	694.7	1	19082
Post-harvesting	hours	45	14.9	1	669
		0	0	0	0
TOTAL				1111.919	30362

BUDGET #1 - FARM LEVEL	---------- Budget information ----------				TOTAL Market
B1. INTERMEDIATE INPUT	Unit	Price	Quantity	Freq	Price
Seed/Seedling	kg	15	139.7	1	2060
Manure	kg	0	0.0	1	0
Chemical fertilizers:	kg	0	0.0	1	0
Nitrogen	kg	8	345.9	1	2790
Phosphate	kg	9	177.2	1	1549
Potash	kg	12	16.4	1	197
Other (liquid)	kg	9	48.4	1	452
Chemicals:	kg	0	0.0	1	0
Pesticides	kg	1,000	0.3	1	250
Herbicides	kg	423	1.9	1	823
Fungicides	kg	0	0.0	1	0
Machinery:				1	0
Tillage	Hours	310	7.38	1	2291
Levelling	Hours	191	5.62	1	1072
Other	Hours	122	1.46	1	178
Sowing & planting	Hours	98	3.20	1	314
Fertilizer appl. 1	Hours	173	1.46	1	253
Fertilizer appl. 2	Hours	0	0.00	1	0
Fertilizer appl. 3	Hours	0	0.00	1	0
Manure application	Hours	0	0.00	1	0
Herbicide application	Hours	326	1.46	1	475
Insecticide application	Hours	500	0.06	1	31
Harvesting	Hours	0	0.00	1	0
Packing and loading	Hours	0	0.00	1	0
Transport costs	Hours	278	11.90	1	3309
Animal Draft	Day	100	1.56	1	156
Packing	SP	90	33.43	1	2997
Transport	SP	254	12.22	1	3105
Water Requirements				1	0
Irrigation 1	cm	2.7	13,793.10	1	37241
Water value	SP/cm	3.0	13,793.10	1	0
Land rent	SP/Ha	8,747	1.00	1	8747
Other1		0	0.00	1	0
Other2		0	0.00	1	0
		0	0	0	0

Interest: on Revolving Fund	*at market*	5.5%	33191	0.666667	1217
	at social	3.0%	50653	0.666667	0
TOTAL		*rate*	*amount*	*year*	69507

BUDGET #1 - FARM LEVEL B1. REVENUES	Unit	Price	Quantity		TOTAL Market
raw cotton	ton	14500	4.00		58000
by product	kg	80	3.9		313
					0
TOTAL REVENUES					58313
TOTAL COST					101362
PROFIT (BEFORE TAXES)					-43049

Table 3. Assessment of the parity price

Computation of parity price				
Product	lint cotton			
Quality	?			
Parity point	?			
	Unit	Source of information	Value at market Price	Value at social price
Wholesale market margin	%	Hypothesis	0.0%	0.0%
FOB to CIF				
CIF price at importing country		Data	1000.00	1000.00
Quality conversion rate				
CIF for Syrian lint				
Insurance cost			20	20
Transport cost		Data	30	30
FOB Price	USD	Data or comp	950.00	950.00
Exchange rate		Data	51.5	51.5
FOB price in SP		Computed	48925	48925
Duties				
Variable				
Customs clearance fees at 0.2%			9.785	
Exportation currency tax			380.00	
Fixed				
2-Shipment licensed value			75	
Stamps			16	
Lead for closing container			5	
Total			485.79	
Price at harbor before custom		Computed	48439.22	48925
Handling cost			195	
Storage cost (14 days)			19	
Other costs			29	
3-Winches cost			3	
1-Agency fees			27	
Transportation from the ginnery			391	
			664	664
Parity price at ginnery			47775	48261

Source: Author elaboration (CAS)

Annex 2: Brief presentation of the PAM

The Policy Analysis Matrix (PAM) provides an analytical framework to estimate the comparative advantage of a given productive system. It compares two accounting entities (Income = Input cost + Factors cost + Profit); one is computed for a level of price observed under the current economic conditions (called private prices), while the second uses the price (social price) that would prevail under perfect market conditions leading to an optimal allocation of resources within the economic system (a situation where the welfare of any economic agent cannot be improved without affecting the welfare of another one). The last line of the matrix is computed by subtracting social values from private values and represents the divergence between the current situation and the optimal situation. Those divergences are due to distortions attributed either, to policy affecting the level of prices (taxes, subsidy), or to market failure (monopoly, externalities) that prevent markets to allocate resources efficiently. Prices prevailing on the world market are taken as the reference for building the accounting entities under social prices.

The Policy Analysis Matrix

	Revenue	Tradable Input	Domestics factors	Profit
Private prices	A	B	C	D
Social prices	E	F	G	H
Divergence	I	J	K	L

For instance, if H>0, a commodity has a comparative advantage because it can be profitably produced in an open and competitive environment without generating any additional costs to the entire economy in the form of financial transfer through government policy or of externalities caused by market failures.

The PAM provides straightforwardly a range of indicators for assessing the efficiency and the comparative advantages of a system.

PAM indicators

Indicators	Formula	Manning
1.Financial Profitability (FP)	[D = A - B - C]	Absolute value of the profit generated by the system at private price
2. Financial Cost-Benefit Ratio (FCB)	[C / (A - B)]	Indicator of the competitiveness of the system. If FCB<1, the system is competitive, if FCB>1 the system is not competitive, FP is negative.
3. Social Profitability (SP)	[H = E - F - G]	Absolute value of the profit generated by the system at social price.
4. Domestic Resource Cost (DRC)	[G / (E - F)]	Indicator of the comparative advantage of the system. If DRC<1, the system have a comparative advantage, meaning that we use less value of Domestic Factors (labor, capital...) than the value added generated (VA= E-F), if DRC>1 the system have no comparative advanta
5. Social Cost-Benefit Ratio (SCB)	[(F + G) / E]	Another indicator for measuring the comparative advantage of the system. It takes into account the full cost of production (F + G) instead of the Domestic factors only. It is a more appropriate ratio to rank the relative position of d
6. Transfers	[L = I + J + K]	Absolute value of the transfer between the economy and the system
7. Nominal Protection Coefficient (NPC)	[A / E]	Indicate the level of protection for the main output, if NPC> 1, the system benefit from a protection, if NPC<1 the system is taxed.
8. Effective Protection Coefficient (EPC)	[(A - B) / (E - F)]	Indicate the total level of protection taking into account the effect of the policy on the private value of the tradable output and tradable input.
9. Profitability Coefficient (PC)	[D / H]	Measure the impact of the policy on the profitability of the system. If PC>1, the system benefit from a net transfer from the economy, if PC<1, the economy benefit from a net transfer from the system.
10. Producers Subsidy Ratio (PSR)	[L / E]	Indicator of the impact of the policy/market distortion on the increase (+) or reduction (-) of the total revenue of the system at social price. i.e. magnitude of the divergence from the reference situation at social price to the current situation at market price.
11. Equiv. Producer Subsidy (EPS)	[L / A]	Indicator of the impact of the policy/market distortion on the increase (+) or reduction (-) of the total revenue

	of the system at market price. Equivalent to the Producer Equivalent Subsidy (PSE) as defined by OECD for trade negotiation. If + it is producer subsidy, if – its consumer subsidy.