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Economic analysis of the cotton industry in Cote d'Ivoire

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This study aims at assessing the competitiveness of the cotton industry in Cote d'Ivoire. The survey involved two hundred and eighty-nine (289) producers, four (04) ginning companies, one (01) spinning company, two (02) crushing companies and seven (07) management structures of the sector. The data were analyzed using Monke and Pearson's (1989) Policy Analysis Matrix (PAM). Results showed that the cotton industry is competitive and has a comparative advantage. The different actors achieve economic and financial profitability. The cotton industry is protected by the agricultural policy of Cote d'Ivoire. Each link has joint protection on the price of outputs and tradable inputs and also an implicit subsidy. In short, despite the disproportionate competition from Asian countries, the cotton sector is performing well. However, only agricultural policy measures aimed at improving yield per hectare, the quality of seed cotton and the prices would benefit the various actors

Keywords: cotton, PAM, profitability, competitiveness, Cote d'Ivoire

Résumé:

Cette étude vise à évaluer la compétitivité de la filière coton en Côte d'Ivoire. Pour sa réalisation, l'enquête a concerné deux cents quatre-vingt-neuf (289) producteurs, quatre (04) sociétés d'égrenage, une (01) société de filature, deux (02) sociétés de trituration et sept (07) structures de gestion de la filière. Les données ont été analysées à l'aide de la Matrice d'Analyse des Politiques (MAP) de Monke et Pearson (1989). Des résultats, il ressort que la filière coton est compétitive et dispose d'un avantage comparatif. Les différents acteurs réalisent une rentabilté économique et financière. Le secteur du coton est protégé par la politique agricole de la Côte d'Ivoire. Chaque maillon bénéficie d'une protection conjointe sur le prix des extrants et les intrants échangeables et aussi d'une subvention implicite. En somme, malgré la concurrence disproportionnée des pays de l'Asie, la filière coton est performante. Cependant, seules les mesures de politique agricole visant à améliorer le rendement à l'hectare, la qualité du coton graine et le prix des produits seraient profitables aux différents acteurs de la filière.

Mots-clés : coton, MAP, rentabilité, compétitivité, Côte d'Ivoire

INTRODUCTION

Cote d'Ivoire is a country in West Africa that has two ecological zones in terms of vegetation. It is the forest located in the Southern part and the Savannah found in the north of the country. The economy, based mainly on agriculture, has relied on these ecological zones to develop agricultural speculations. Thus, in the southern forest, there has been a cacoa-coffee pairing, which accounts for almost 20% of the Gross Domestic product

(GDP) and 40% of the export earnings. In the north, cotton cultivation has become essential and today a contribution of 1.7% in the GDP (FAO, 2010). It remains one of the main sources of monetary income in the northern and central regions of the country.

Besides, it occupies more than 150 000 producers and directly or indirectly feeds nearly 3.5 million of people. Cotton represents about 10% of the volume of exports and occupies the 3rd place after the coffee and cocoa. In terms of results, the turnover of the cotton industry is between 100 and 120 billion of Franc CFA of which 70% to 80% in currency (INTERCOTON, 2010).

It should be noticed, however, that the cotton sector is not immune to the effects of price declines on the international market in recent years. Better, to guarantee a minimum income to the producers, the State had to intervene several times to support the cotton industry by important financial contributions (ARECA, 2013).

Moreover, even if a great literature exists on cotton, one notices a lack of study on the competiveness of this sector. Then, this study will allow us to examine the profitability, competiveness and efficiency of the sector and also to evaluate the impact of agricultural policies.

Specifically, it will be to:

- analyze the financial and economic profitability, the comparative advantage, the incitation measures put in place as well as the social gain generated by various subsectors of the cotton sector ;
- measure the impact of government policies on private profitability;
- estimate the current resource efficiency used in the different production systems ;
- evaluate the level of protection of the actors and determine the factors that influence the profitability and competiveness of the sector.

METHODOLOGY

Study Area

The survey took place from May 25th to June 30th, 2017. The choice of sites was made by taking into account the importance of the activity according to the data of the Intercoton (Structure responsible for the management of the cotton sector). So, on that basis, we chose the sub-prefectures of Kassere and Baya from the department of Boundiali for producers and Korhogo and Bouaké towns for ginning, spinning and crushing companies.

Sampling

The target of population of our survey mainly includes: cotton producers, ginning, spinning and crushing companies, the organizations of management, of regulation and of the development of the cotton sector and professional agricultural organizations.

Our sampling consists of three hundred (300) actors of the sector distributed as follows: 289 producers, (04) ginning companies, (02) crushing companies, (01) spinning company and (07) framework structures and regulation of the sector. The number of seed cotton producers surveyed (289) is obtained on the basis of one-tenth of the total number of producers identified. This sample is chosen excessively with reference to the result obtained from the following formula:

$$Xi = n.\frac{ni}{N}$$

where:

Xi = number of producers to be surveyed per production area;

n = size of sampling;

ni = number of producers per production area;

N = total population of producers;

$Xi = n.\frac{ni}{N}$ = relative frequency.

The number of producers surveyed per site is recorded in the Table 1

Table 1: Distribution of respondents per production areas

Sites (Villages)	ni (agricultural production unit listed)	ni/N	n.ni/N	Xi (agricultural production unit surveyed)
Landjougou	217	0.07519	21.73008	22
Pangafre	206	0.07138	20.62855	21
Chiere	198	0.06861	19.82744	20
Kassere	202	0.06999	20.228	20
Yiele	196	0.06791	19.62717	20

Table 1 cont'd

Tiasso	235	0.08143	23.53257	23
Gbalo	310	0.10742	31.04297	31
Pinvoro	226	0.07831	22.63132	23
Lafi	252	0.08732	25.23493	25
Naganan	280	0.09702	28.03881	28
Torba	187	0.0648	18.72592	19
Siofan	152	0.05267	15.22107	15
Sissougou	225	0.07796	22.53119	22
TOTAL (N)	**2886**	**1**	**289**	**289**

Data Analysis Method

Policy Analysis Matrix (PAM)

In this study, the Policy Analysis Matrix (PAM) has been used for the analysis. That tool is commonly used in studies aiming at evaluating the impact of an economic policy on the efficiency of agricultural production systems. It is a double entry accounting system that allows you to evaluate the impact of the macroeconomic policies on producers and community incomes. The PAM is composed of two (2) types of budgets: a budget valued at private prices or financial prices and the other at social costs or economic costs.

Before the budget design, it is necessary to distinguish between tradable and domestic inputs. Tradable or marketable products are those which can be theoretically imported or exported while non-tradable products or domestic factors are those which are not normally tradable on international markets. In this case, with regard to exchangeable inputs, we can quote : the spray, the cart, the plow, fertilizers, phytosanitary products and the small material (hoe, sowing machine) for seed cotton producers ; the fiber conditioning equipment (general compacter, fiber slides, humidification device, groomer feeder, groomer, hydraulic and strapping press / bagging), the seed cotton transport equipment(tractors, containers, poly skips), the seed cotton storage equipment (transport containers, compacted modules) and unloading systems (hydraulic telescopes, the module feeder) for the ginning; textile spinning machines consisting of cleaner-harvester or cleaning machine, carding, stretching or drawing and processing equipment such as the bleaching and dyeing for textile spinning and lastly the crushing equipment consisting of settling tanks, a system consisting of breaker or grinder, mixer, horizontal settling tanks and separator for the crushing. As for domestics inputs, it is the ground, manpower and capital for seed cotton producers ; of exploitation capital, financial costs, insurances, taxes, social charges, shops, staff costs, maintenance, security and training costs, energy for ginners, spinners and crushers.

Financial prices are those that actors pay or receive while economic prices reflect the cost of the economy and society. For determining the financial prices of rural labor, agricultural land and capital, the opportunity cost was estimated. Thus, for labor, the wages of agricultural laborers in times of intense activity was price as opportunity cost. For land, the rental cost has been taken as opportunity cost. As for the capital, the opportunity cost is that of the financial market. As the determination of economic prices is concerned, the principle is based essentially on a valuation of production factors and goods and services produced at international parity prices according to the module EASYpol 046 (FAO, 2005). Then, for all imported tradable, the parity price is the sum of the border price and shipping cost. As for exported goods or products, their parity price is the difference between the price of goods at the point of entrance, the CIF price and exit price of the country, the FOB. For the value-added elements of the operating account, we used standard conversion factors:

- labor costs: conversion factor equal to 1;
- transfers with State (taxes and subsidies): conversion factor equal to 0;
- social charges, financial costs and insurance: conversion factor equal to 0;
- elements of capital (technical and economic depreciation): conversion factor equal to 1;
- rental fees: conversion factor equal to 0;
- transport: conversion factor equal to 0.85;
- miscellaneous management fees: conversion factor equal to 0.96;
- expenditure on non-depreciable tools: conversion factor equal to 0.97.

The construction of the Policy Analysis Matrix was based on the prices observed in 2016. Tables 2 and 3 present respectively the model and competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM).

Table 2: Policy Analysis Matrix (PAM)

	Revenues	Input cost		Profit
		Tradable	Non-tradable	
Private prices	A	B	C	D
Social prices	E	F	G	H
Net transfers	I=A-E	J=B-F	K=C-G	L=D-H

Source: Monke and Pearson (1989)

Table 3: Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM)

1-	Private profit	D=A-B-C
2-	Private Cost Ratio	PCR=C/ (A-B)
3-	Social profit	H=E-F-G
4-	Domestic Resource Cost Ratio	DRC=G/(E-F)
5-	Social Cost Ratio	SCR= (F+G)/E
6-	Transfer	L=I-J-K
7-	Nominal Protection Coefficient	NPC=A/E
8-	Effective Protection Coefficient	EPC= (A-B)/(E-F)
9-	Profitability Coefficient	PC=D/H
10-	Subsidy Ratio to Producers	SRP=L/E
11-	Equivalent Subsidy to producers	ESP=L/A

RESULTS AND DISCUSSION

Competitiveness of the sub-sector of seed cotton production

Policy Analysis Matrix (PAM) of seed cotton producers

The analysis of the results in the Table 4 indicates that private and economic profits are greater than 0. The production of seed cotton is profitable for the producers of the department of Boundiali. It also contributes to the economic growth of the locality. Moreover, the sub-sector of seed cotton production has a comparative advantage and, as such, the country has every interest in encouraging this activity. Positive net transfers say economic prices are lower than what they currently receive. Then cotton producers in this area are subsidized. These results are confirmed the one of Kouakou (2014) that found that the cotton producers of Cote d'Ivoire benefit from subsidies on agricultural inputs and on the price of cotton fiber. In fact, cotton cultivation, in addition to its economic importance, has a social function. It helps reduce disparities and poverty in the northern and centra regions.

Table 4: PAM for the production of one hectare of cotton

	Revenue	Input cost		Profit
		Tradable inputs	Non tradable inputs	
Private prices	A 266 325	B 134 795	C 119 805	D 11 725
Social prices	E 246 225	F 124 198	G 115 030	H 6 997
Net transfers	I 20 100	J 10 597	K 4 775	L 4 728

Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM) of seed cotton production

According to the results in the Table 5, the Private Cost Ratio (PCR), the Social Cost Ratio (SCR) and the Domestic Resource Cost Ratio (DRC) are less than 1. The producers allocate their resources efficiently. As a result, the income from the cotton production activity is well above the expenditure. It is cheaper in domestic resources to produce cotton locally. The country should increase its exports in the cotton sector. The production activity is economically profitable. Domestic production is competitive. The cost of inputs is lower than the income generated by cotton. These same results also indicate that the production of cotton has an Effective Protection Coefficient (EPC) and a Nominal Protection (NPC) respectively greater than 1. The producers thus benefit from a subsidy of the order of 2%. They are thus protected by the current Ivorian agricultural policy.

Table 5: Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM) of seed cotton production

1-	Private profit	D=A-B-C	11 725
2-	Private Cost Ratio	PCR=C/ (A-B)	0.91
3-	Social profit	H=E-F-G	6 997
4-	Domestic Resource Cost Ratio	DRC=G/(E-F)	0.94
5-	Social Cost Ratio	SCR= (F+G)/E	0.97
6-	Transfers	L=I-J-K	4 728
7-	Nominal Protection Coefficient	NPC=A/E	1.08
8-	Effective Protection Coefficient	EPC= (A-B)/(E-F)	1.09
9-	Profitability Coefficient	PC=D/H	1.68
10-	Subsidy Ratio to Producers	SRP=L/E	0.02
11-	Equivalent Subsidy to producers	ESP=L/A	0.02

Competitiveness of sub-sector of seed cotton ginning

Policy Analysis Matrix (PAM) of ginning companies

The activity of ginning presents a financial profit higher than 0. The sector of ginning is financially profitable (cf. Table 6. Moreover, with an economic return equal to 14 318 FCFA / ton and greater than 0, it can be said that this activity contributes to the economic growth of the locality and that it has a comparative advantage. The country has every interest in encouraging cotton processing. In addition, the analysis of the net transfer shows that the ginners are subsidized at 2 067 FCFA / ton. This result is similar to that of Mariem (2013). In his study conducted on the evaluation of the export potential of cotton and textiles in Cote d'Ivoire, this author came to the conclusion that the ginning function is profitable.

Table 6: PAM of ginners for one ton of seed cotton

	Revenue	**Inputs cost**		**Profit**
		Tradable inputs	**Domestic factors**	
Private prices	A 373 860	B 185 705	C 171 770	D 16 255
Social prices	E 347 730	F 169 600	G 163 812	H 14 318
Net transfers	I 26 130	J 16 105	K 7 958	L 2 067

Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM) of the ginning of seed cotton

The ginning subsector of the cotton sector has a Private Cost Ratio (PCR), a Domestic Resource Cost Ratio (DRC) and a Social Cost Ratio (SCR) of less than 1, respectively, according to the results in Table 7. The ginning is therefore a financially and economically profitable activity. The income from the activity is therefore well above the expenditure. In addition, there is a financial flow transfer of 2 067 FCFA / ton from the rest of the economy to the ginners. The ginning has a comparative advantage. It is cheaper to use domestic resources to process cotton locally than to import it.

Also, with an Effective Protection Coefficient (EPC) and a Nominal Protection Coefficient (NPC) of just over 1, it can be said that the ginning activity enjoys joint protection on the export selling price of cotton fiber and on tradable inputs. The ginners benefit from an implicit subsidy linked to the policy of transformation of agricultural raw materials initiated by the Ivorian State. This result is in adequacy with those of Kouakou (2014). According to his, the Ivorian State encourages all actions for the transformation of agricultural production.

Table 7: Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM) of the ginning of seed cotton

1-	Private profit	D=A-B-C	16 385
2-	Private Cost Ratio	PCR=C/ (A-B)	0.91
3-	Social profit	H=E-F-G	14 318
4-	Domestic Resource Cost Ratio	DRC=G/(E-F)	0.92
5-	Social Cost Ratio	SCR= (F+G)/E	0.96
6-	Transfers	L=I-J-K	2 067
7-	Nominal Protection Coefficient	NPC=A/E	1.08
8-	Effective Protection Coefficient	EPC= (A-B)/(E-F)	1.06
9-	Profitability Coefficient	PC=D/H	1.14
10-	Subsidy Ratio to Producers	SRP=L/E	0.01
11-	Equivalent Subsidy to producers	ESP=L/A	0.01

Competitiveness of the spinning sub-sector

Policy Analysis Matrix (PAM) of spinning companies

The financial profit (D) and the economic profit (H) of spinners are superior to 0 according to the Table 8. The cotton spinning business is financially and economically profitable. It also contributes to the economic growth of the locality and has a comparative advantage. The farmer has every interest in encouraging the processing of cotton fiber. However, positive net transfers (J) and (K) indicate that tradable inputs and domestic factors are taxed.

Table 8: PAM of spinning for a ton of cotton fiber

	Revenue	**Input cost**		**Profit**
		Tradable inputs	**Domestic factors**	
	A	B	C	D
Private prices	971 300	763 000	193 569	14 731
	E	F	G	H
Social prices	950 200	746 700	189 453	14 047
	I	J	K	L
Net transfers	21 100	16 300	4 116	684

Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM) of the spinning companies

When reading Table 9, the subsector of the spinning has a Private Cost Ratio (PCR), a Domestic Resource Cost Ratio (DRC) and a Social Cost Ratio (SCR) less than 1. The spinning is a financially and economically profitable activity. The revenue from the activity is well above the expenditure. The spinners efficiently allocate their resources. It is cheaper in domestic resources to locally process cotton fiber than to import it. Moreover, with a net transfer valued at 684 FCFA / ton and positive, one can retain that the spinners benefit from a subsidy. This economic policy measure is confirmed by an Effective Protection Coefficient (EPC) and a Nominal Protection Coefficient (NPC) higher than 1. In fact, spinners benefit from joint protection on the selling price for the export of yarns and on tradable inputs. This result is identical to those obtained by Mariem (2013) in a study on the evaluation of the export potential of cotton and textiles in Cote d'Ivoire.

Table 9: Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM) of the spinning companies

1-	Private profit	D=A-B-C	14 731
2-	Private Cost Ratio	PCR=C/ (A-B)	0.93
3-	Social profit	H=E-F-G	14047
4-	Domestic Resource Cost Ratio	DRC=G/(E-F)	0.93
5-	Social Cost Ratio	SCR= (F+G)/E	0.99
6-	Transfers	L=I-J-K	684
7-	Nominal Protection Coefficient	NPC=A/E	1.02
8-	Effective Protection Coefficient	EPC= (A-B)/(E-F)	1.02
9-	Profitability Coefficient	PC=D/H	1.05
10-	Subsidy Ratio to Producers	SRP=L/E	0.01
11-	Equivalent Subsidy to producers	ESP=L/A	0.01

Competitiveness of the crushing subsector

Policy Analysis Matrix (PAM) of the crushing subsector

According to Table 10, the crushing activity of the cotton seed generates a positive and interesting financial and economic profit. The activity is profitable for the crushers and also contributes to the economic growth of the locality. The transfers (J) and (K) are positive. This means that tradable and non-tradable factors are taxed.

Table 10: PAM of crushers for a ton of cotton seed

	Revenue	**Inputs cost**		**Profit**
		Tradable inputs	**Domestic factors**	
Private prices	A 825 000	B 455 260	C 357 540	D 12 200
Social prices	E 810 000	F 444 500	G 354 762	H 10 738
Net transfers	I 15 000	J 10 760	K 2 778	L 1 462

Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM) of the seed crushing sub-sector

Table 11 shows that the Private Cost Ratio (PCR), the Social Cost Ratio (SCR) and the Domestic Resource Cost Ratio (DRC) of the crushers are respectively less than 1. As a result, the activity is financially and economically profitable. The revenue from the crushing activity, which largely exceeds the expenditures made. The spinners efficiently allocate their resources. There is a transfer of financial flows of 1 462 FCFA / ton from the rest of the economy to the crushers and thus the crushers benefit from an implicit subsidy. Furthermore, the crushing subsector has a comparative advantage with regard to the results recorded in the table below. It will be remembered that it is less expensive than domestic resources to locally transform the cotton seed than to import it. This economy policy measure is confirmed by an Effective Protection Coefficient (EPC) and a Nominal Protection Coefficient (NPC) slightly higher than 1. Crushing benefits from joint protection on the export selling price of cottonseed oil and on tradable Inputs. These results are in conformity with the one of Fabio (2006) for the evaluation of developpement of a cotton sector strategy. This author concludes that the protection on the export selling price of cottonseed oil and on tradable inputs reduces the effects of competition

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Table 11: Competitiveness and economic efficiency indicators of the Policy Analysis Matrix (PAM) of crushing of the cotton seed

1-	Private profit	D=A-B-C	12200
2-	Private Cost Ratio	PCR=C/ (A-B)	0.97
3-	Social profit	H=E-F-G	10 738
4-	Domestic Resource Cost Ratio	DRC=G/(E-F)	0.97
5-	Social Cost Ratio	SCR= (F+G)/E	0.99
6-	Transfers	L=I-J-K	1 462
7-	Nominal Protection Coefficient	NPC=A/E	1.02
8-	Effective Protection Coefficient	EPC= (A-B)/(E-F)	1.01
9-	Profitability Coefficient	PC=D/H	1.14
10-	Subsidy Ratio to Producers	SRP=L/E	0.001
11-	Equivalent Subsidy to producers	ESP=L/A	0.001

CONCLUSION

The main objective of the study is to assess the economic competitiveness of the cotton industry in Cote d'Ivoire. On the basis of the results, it appears that each actor in the sector benefits financially. The cotton sector is competitive and has a comparative advantage. All actors have an interest in continuing their activities. It is cheaper to produce and process cotton locally. In addition, these actors benefit from an implicit subsidy and protection through agricultural policy of Cote d'Ivoire. Nevertheless, the sector is suffering the effects of disproportionate competition from Asian countries. Thus, to improve the competitiveness of the cotton sector in Cote d'Ivoire, agricultural policies must favor a better allocation of productive resources by taking into account the determinants of competitiveness such as prices, the quality of seed cotton, the output and the cost of production.

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