Characteristics associated with access to agricultural inputs in the cotton sector

The case of the Kara region in Togo

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Abbreviations and acronyms

FAO ..... Food and Agriculture Organization of the United Nations

FNGPC..... Fédération nationale des groupements de producteurs de coton

FCFA ..... Franc CFA

GDP ..... Gross Domestic Product

ICAC ..... International Cotton Advisory Committee

NSCT ..... Nouvelle Société cotonnière du Togo

OECD..... Organisation for Economic Co-operation and Development

Abstract

This study identifies some key factors explaining the demand for agricultural inputs (e.g., fertilisers, herbicides, insecticides and seeds) in the cotton sector in the Kara Region in Togo.

This is an important research question considering that low cotton production, due in large part to low yields, limits Togo's ambition to develop a cotton industrial sector. It is through increased and better use of inputs that the country will be able to produce enough cotton to develop a vibrant cotton industry as well as a range of cotton by-products. The study uses a logit regression model and data from the Kara region for the 2021/2022 crop year. The results show differences according to the sources of input supply. Togolese cotton growers can obtain inputs from the Nouvelle Société Cotonnière du Togo (NSCT) on credit, from outside the NSCT, or from both sources at the same time. The demand for inputs from the NSCT is positively correlated with the level of education, the number of years spent in an agricultural cooperative and negatively correlated with the size of the farm. The NSCT should therefore improve farmers' knowledge and skills in using fertilisers, herbicides, insecticides and seeds, targeting as a priority, farmers with less than secondary education to improve access to agricultural inputs. Efforts must also be made to bring input distribution points closer to cotton growers by investing in transport infrastructure. In addition to the problem of affordability, access to agricultural inputs remains a serious issue in terms of the quality of infrastructure and the knowledge needed to use them in the cotton sector.

1. Introduction

In developing countries, limited access to inputs such as fertilisers, herbicides, insecticides and seeds is one of the obstacles to increasing yields in the agricultural sector. This problem is more prevalent in sub-Saharan Africa, where low fertiliser use is one of the factors explaining low agricultural productivity growth (Morris et al., 2007). The average fertiliser application rate is 22 kg per hectare in sub-Saharan Africa, compared with 146 kg per hectare worldwide.[1] This low level is partly explained by the cost of fertiliser, which is sometimes higher than the selling price of the final product (ibid). The lack of knowledge among many farmers about how to use agricultural inputs effectively is also an obstacle to their adoption by African farmers (Gianessi and Williams, 2011; Tefera et al.,2020). The lack of inputs in several regions is another explanation for the low use of agricultural inputs in the farming sector (Morris et al., 2007).

In Togo, as in most countries in sub-Saharan Africa, the agricultural sector accounts for a significant proportion of national wealth. The World Bank estimated that the agriculture sector accounted for 19.3 per cent of the gross domestic product (GDP) of Togo in 2021.[2] The cotton sector, which accounted for 0.92 per cent of GDP in 2019, plays a key role, particularly in rural areas, where it is the main source of employment (UNCTAD, 2022). This sector, which accounted for 11.45 per cent of Togo's total exports of goods in 2015, has seen this share fall to 8.21 per cent in 2021.[3] This share of Togo's exports of goods has been falling steadily in recent years due to the decline in production. Despite this, cotton remains the leading cash crop and is the main source of income for many households. The cotton sector, therefore, plays a vital role in the fight against poverty and in increasing the standard of living of many households, especially in rural areas in the north of the country.

This paper is a follow-up to the feasibility study on the development of cotton by-products, carried out by UNCTAD in 2022. The development of the cotton value chain is part of the second pillar of the Government's 2020-2025 roadmap[4] which aims to make agriculture a real engine for growth and job creation and will enable Togolese cotton growers to diversify their sources of income. To increase cotton growers' sources of income, the feasibility study recommends setting up an industry based on cotton co-products such as oil, cake, stalks and seeds. However, Togo has no cotton fibre or seed processing facilities, and all production is exported without any transformation (UNCTAD, 2022). Moreover, the decline in cotton production is a major obstacle to this strategy. This decline can be explained in part by the very low level of cotton yields resulting from the low use of agricultural inputs.

The cotton production[5] reached the lowest level in a decade in the 2021/2022 crop year with only 52 521 tonnes produced, according to the NSCT.

Cotton production fell from 137 249 to 52 521 tonnes between 2018-2019 and 2021-2022, a decline of 62 per cent. The NSCT forecast that production would fall again in the 2022-2023 season.[6] The drop in income caused by the fall in cotton prices following the COVID-19 pandemic partly explains the fall in production for households whose livelihoods depend heavily on the cotton sector. As a result, some cotton farmers have abandoned cotton production in favour of other cash crops, such as soya, which are much more profitable and less demanding (UNCTAD, 2022).

1 https://blogs.worldbank.org/voices/transformed-fertilizer-market-needed-response-food-crisis-africa
2 https://donnees.banquemondiale.org/indicator/NV.AGR.TOTL.ZS?locations=TG
3 The data comes from UN Comtrade (consultation date: 19 January 2023).
4 https://presidence.gouv.tg/feuille-de-route-gouvernementale-togo-2025/
5 In this document, cotton production refers to the quantity recorded immediately after harvest, comprising both cotton fibre and seed, without any processing.
6 https://www.togofirst.com/fr/gestion-publique/1212-11096-togo-lancement-de-la-campagne-2022-2023-de-commercialisation-du-coton

The main objective of this paper is to identify the key characteristics of cotton farmers affecting their use of agricultural inputs to understand how Togo could increase productivity in the cotton sector. This paper describes the cotton sector in Togo, and analyses access to inputs according to sources of supply. It aims to add to the literature on the socio-economic and institutional factors explaining access to agricultural inputs in Togo's cotton sector. The interest of this analysis lies in the fact that it deals with the issue of access to agricultural inputs in its institutional dimension, emphasising the role played by the NSCT. Access to inputs via the NSCT offers cotton growers a range of economic and technical benefits, enhancing their ability to develop their farming activities in an efficient and sustainable way. Firstly, through the NSCT, cotton farmers can acquire inputs on credit, enabling them to benefit from payment facilities and minimise short-term financial constraints. Secondly, the NSCT regularly provides cotton farmers with training and technical advice aimed at optimising the use of inputs, improving yields and promoting the sustainable management of agricultural resources (UNCTAD, 2022).

The rest of the document is organised as follows. The second part is a literature review of the main determinants of the use of agricultural inputs and the consequences of the obstacles associated with access to agricultural inputs in sub-Saharan Africa. In the third part, the paper describes the evolution of cotton production from the 2012-2013 to 2021-2022 crop years and the role played by the NSCT in the distribution of agricultural inputs. Part four of the paper describes the data and research methodology used, and the fifth part presents a descriptive analysis of access to agricultural inputs and the results of the estimation of an econometric model explaining the characteristics of cotton growers associated with this access. The paper's final part presents policy recommendations for the cotton sector in Togo based on the empirical results.

2. Literature review

In sub-Saharan Africa, the agricultural sector faces challenges related to the low use of seeds, fertilisers, herbicides and insecticides, which hampers the sector's growth and productivity. Access to agricultural inputs is limited by both socio-economic and institutional factors.

The socio-economic factors explaining the low use of fertilisers come from both demand and supply. Firstly, incentives to use fertilisers are hampered by low and variable crop yields on the one hand, and high fertiliser costs relative to crop prices on the other (Morris et al., 2007). The inability of many farmers to secure resources to purchase inputs is another major explanation of the low level of agricultural input use (Kelly, 2006; Obisesan et al., 2013).

On the supply side, Morris et al. (2007) explain the very low level of private investment in fertiliser distribution by excessive regulations, high taxes and fees, the weak and dispersed nature of demand, the small size of the market, high transport costs due to the inadequate road and rail infrastructure, and the limited and high cost of finance. These factors, therefore, limit fertilizer use by farmers in sub-Saharan Africa. The need for timely availability of affordable agricultural inputs on the market and the inefficiency of the agricultural input market create a lack of supply (Morris et al., 2007).

Applying agricultural inputs requires following and applying a specific technical itinerary. Many farmers' lack of knowledge about the effective use of inputs still limits demand (Nkamleu and Adesina, 2000; Gianessi and Williams, 2011; Tefera et al., 2020). The level of education, therefore, plays an important role in the use of agricultural inputs.

Regarding institutional factors, agricultural policies and government regulations play a crucial role in facilitating or limiting access to inputs. In addition, public investment in rural infrastructure, such as roads, warehouses and markets, is essential to improve the availability and accessibility of inputs.

Access to credit is another key factor explaining access to agricultural inputs (Obisesan et al., 2013, Tefera et al., 2020). The limited use of traditional forms of credit[7] to finance inputs in sub-Saharan Africa has several consequences. For example, it limits farmers' ability to access modern inputs, which affects their productivity and income. Adjognon et al. (2017) show that the use of traditional credit, whether formal or informal, is extremely low and that farmers mainly finance modern input purchases with money from off-farm activities and crop sales. Being a member of an agricultural cooperative has a positive influence on the use of agricultural inputs by providing farmers with shared resources and knowledge exchange platforms that improve access to inputs and promote their efficient use (Obisesan et al., 2013; Abate et al.,2014; Tefera et al., 2020). The distance between farms and input markets negatively impacts access to agricultural inputs by increasing transport costs, causing delivery delays and reducing the availability of inputs (Obisesan et al., 2013; Nkamleu and Adesina, 2000). Larger farm size has a positive impact on access to agricultural inputs by providing economies of scale, allowing farmers to have a greater likelihood of attracting input suppliers (Obisesan et al., 2013; Tefera et al., 2020).

The limited use of agricultural inputs has many harmful consequences in sub-Saharan Africa. It leads to low agricultural productivity, which limits farmers' incomes and means of subsistence. It is also responsible for the disparity between farmers' potential yields and actual crop yields compared with other regions (Sadiq et al., 2022).

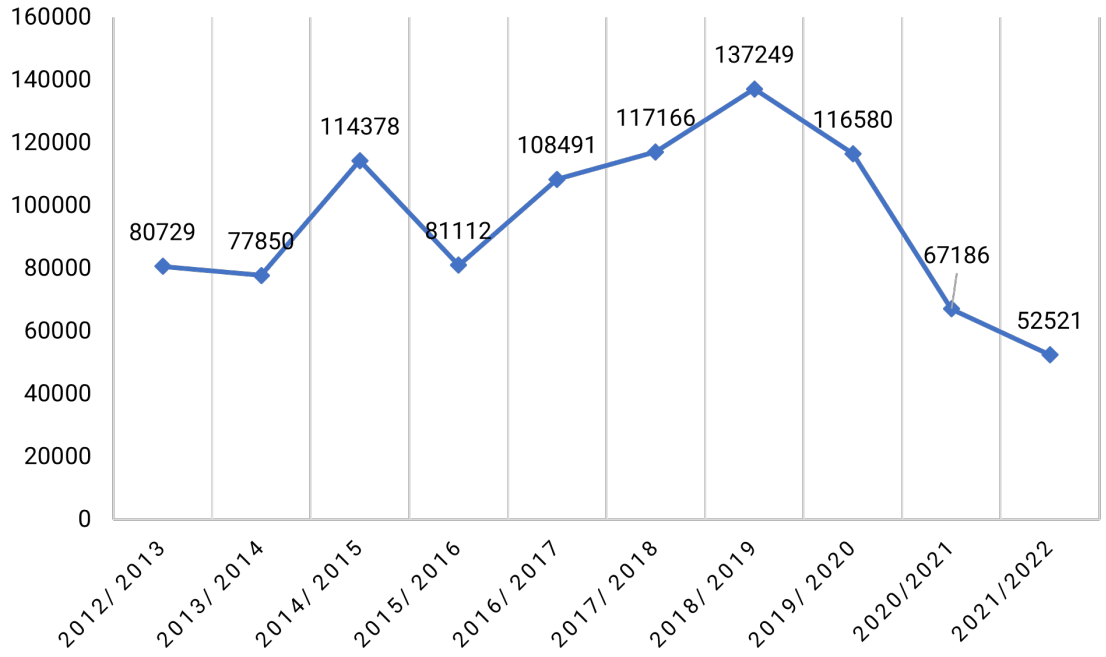
[7] Adjognon et al refer to loans from formal sources (banks), semi-formal sources (microfinance) and informal sources (friends, relatives, cooperatives, etc.).

3. Cotton production in Togo and the role played by the NSCT in the distribution of agricultural inputs

3.1 Trends in cotton production

Over the ten crop years from 2012-2013 to 2021-2022, cotton production in Togo fluctuated significantly due to various factors such as the price of cotton, weather conditions, pest problems, and the effects of the COVID-19 pandemic on demand and production. Between 2016 and 2019, cotton production rose from 81 112 to 137 249 tonnes, an increase of 69 per cent (Figure 1). However, measures put in place to contain the COVID-19 pandemic led to a drop in global demand for cotton, resulting in a fall in the domestic price from 265 CFA francs to 225 CFA francs[8] between the 2019-2020 and 2020-2021crop years (UNCTAD, 2022). The fall in cotton prices partly explains the drop in production, from 116 580 tonnes to 67 186 tonnes between 2019/2020 and 2020/2021, a drop of 42 per cent. This massive drop in production can also be explained by the reduction in the number of producers between 2019 and 2022, which fell from 153 460 to 69 261, a 55 per cent reduction according to the NSCT.

Figure 1. Cotton production, 2012/2013 - 2021/2022 (in tonnes)



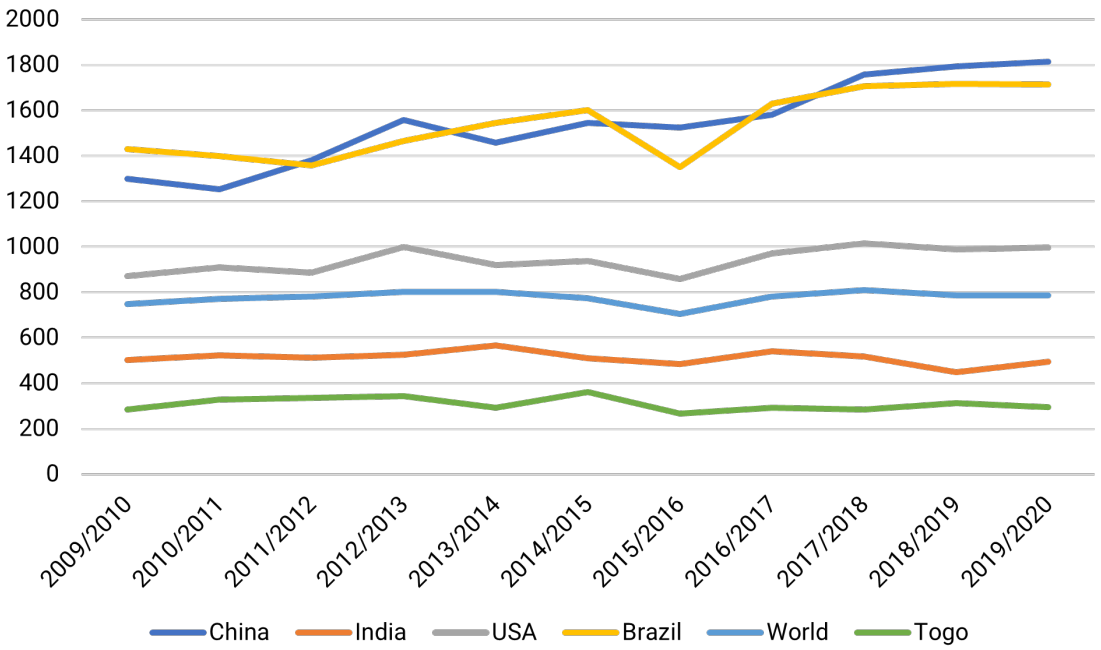
Source : UNCTAD based on data from NSCT.

At the national level, crop yields never reached 400 kg/ha from 2009/2010 to 2019/2020 and fluctuated widely between 267kg/ha and 362 kg/ha over this period (Figure 2). This level of yield is still far from the potential of the STAM 190 variety, which is currently the most widely grown in Togo (UNCTAD, 2022). Soviadan et al. (2019) explain the variations observed in cotton yields in recent years by climate

[8] The local price of cotton depends on the international price according to a mechanism established between the NSCT and the FNGPC. For more details on this mechanism, see UNCTAD/TCS/DITC/INF/2022/6, section 4.1.

change, characterised by increasingly irregular rainfall and severe droughts. The low level of technical efficiency among cotton growers also partly explains the decline in crop yields, referring particularly to the inefficient use of agricultural inputs (Ali and Kpakpabia, 2019). Difficult access to agricultural inputs, which complicates compliance with technical itineraries,[9] also helps to explain the low yields observed in the cotton sector in Togo (UNCTAD, 2022).

Figure 2. Cotton yields of the four mains producers in the world and Togo (kg/ha)



Source: UNCTAD based on data from International Cotton Advisory Committee (ICAC).

Compared with the rest of the world, Togolese cotton yields[10] are still far from those of the world's leading cotton producers such as India, China, the United States, and Brazil (OECD, 2020). The adoption of new technologies explains the increase in yields observed in Brazil, while agricultural yields in China are due to its high use of fertilisers and pesticides (OECD, 2020). The use of transgenic cotton partly explains the high yields in the United States (Fleming et al., 2018). India's cotton yields are very low. However, India is one of the world's leading cotton producers, thanks to an increase in the area under cultivation.

To increase cotton production, Togo has two levers, in principle: expansion of cultivated areas like India or increasing cotton yields like in Brazil and China. The first lever comes up against the problem of competition with other crops such as soya, maize, and sorghum in a country where the amount of arable land is limited. The second lever seems to be the one that can be activated in the short term. Increasing the consumption of fertilisers, herbicides, insecticides, and seeds, and using them efficiently, appear to be the best way of increasing cotton production.

[9] The technical itinerary is a set of rules to be followed when growing a crop. For cotton, these rules concern the choice of plot, land preparation, sowing and weeding dates, the choice of different fertiliser formulas, their doses and application dates, and the choice of herbicides and their application methods.

[10] There is a difference between the data provided by NSCT and that which comes from ICAC. To be able to make a comparison with other countries, we use ICAC data.

3.2 Evolution of the cotton sector and the role of the NSCT in access to agricultural inputs

From 2009 to 2021, the cotton sector in Togo underwent many changes. All of them had a single objective: to revive cotton production in the country. In January 2009, NSCT replaced Société togolaise du coton (SOTOCO) (Kinvi et al., 2021). From 2009 to 2020, NSCT was a Public-Private company with a capital of 2 billion CFA francs,[11] 60 per cent of which was held by the Togolese government and the remaining 40 per cent by the Fédération Nationale des groupements de producteurs de coton (FNGPC) (Ibid).[12] In 2021, the Togolese government sold 51 per cent of its shares to OLAM group, a multinational enterprise, for 22 billion CFA Francs, thereby privatising NSCT and increasing the capital from 2 to 25 billion CFA francs (UNCTAD, 2022). The FNGPC retains 25 per cent of the company and the government 24 per cent.[13] All these changes are in line with the recommendations of the second pillar of the Togolese government's roadmap.

The NSCT is involved in all stages from production to marketing of seed cotton and plays a major role in cotton production in Togo. It is responsible for the distribution of agricultural inputs, the collection and transport of seed cotton from farmers to the ginning factories and its marketing. In the first part of this value chain, the NSCT supports production by purchasing agricultural inputs and distributing them to the cotton producer groups[14] (GPC), which then distribute them to cotton farmers. It also sets the price of agricultural inputs to the GPCs. Within this framework, the NSCT is responsible for distributing fertilisers, herbicides, insecticides, and seeds, which are largely subsidised by the state to enable cotton growers to access them at a lower cost (UNCTAD, 2022).

Overall, the use of agricultural inputs is crucial to increase cotton production. Insecticides and herbicides are used to protect the cotton crop from insect pests and weeds. Fertilisers are used to improve soil fertility and play an important role insofar as Togo's cotton basins are characterised by organic soil poverty, which does not allow yield targets to be met naturally (UNCTAD, 2022). The quality of seeds provided by the NSCT could also be an important determinant of cotton production. For example, drought-resistant seeds make production less dependent on rainfall conditions (Ibid). The agricultural inputs distributed are paid for by cotton farmers at the time of the sale of their crop. Thus, cotton farmers have access to NSCT inputs on credit. The amount of agricultural inputs supplied is highly dependent on the credibility and accessibility of the cotton farmers, as well as the size of the area dedicated by the cotton farmers to growing cotton (NSCT, 2021). In addition, cotton farmers can buy more expensive inputs outside the NSCT to cultivate additional areas to those declared to the NSCT.

The inputs distributed by NSCT have the advantage of being cheaper compared to other distributors. For the 2022-2023 cropping season, NSCT has set the price of a 50kg bag of 46 per cent N urea fertiliser at 13,750 CFA francs[15], compared to a market price of 18,000 CFA francs[16]. However, certain difficulties such as delays in distribution and the unavailability of inputs mean that some cotton growers turn exclusively to non-NSCT sellers to obtain their inputs because they are more accessible. Togolese cotton growers, therefore, can obtain agricultural inputs from the NSCT, from outside, or from both sources.

[11] 1 euro = 655.56 FCFA
[12] The FNGPC groups together the regional unions of cotton producers.
[13] https://www.togofirst.com/fr/agro/2411-6862-coton-olam-prend-le-controle-de-la-nsct-avec-15-millions
[14] Cotton producers' group at prefectural level
[15] https://www.republicoftogo.com/content/download/108997/2823788/1#:~:text=S'agissant%20des%20prix%2C%20la,soit%2035%20FCFA%20et%2055
[16] https://www.togofirst.com/fr/agro/0305-9873-campagne-agricole-2022-2023-le-prix-du-sac-d-engrais-fixe-a-18000-fcfa

4. Research methodology

4.1 Data

This paper uses data collected in the Kara region of Togo in the 2021-2022 cotton season. The Kara region is in the north of Togo, with Kara as its capital. It is bordered to the south by the Central region, to the north by the Savanes region, to the west by Ghana and the east by Benin. It is a region with a single annual rainy season.

The sampling method used was random and selection was made at the village level. The survey aimed to collect information on farmers' characteristics, as well as those of their cotton farms, access to agricultural inputs and the importance of cotton in relation to other crops (soya, maize, sorghum, etc.). The sample consists of 423 farmers interviewed.

4.2 Modelling

The objective of this section is to present the model used to identify the characteristics of cotton producers associated with access to agricultural inputs in the cotton sector in Togo. Given the previous discussion, four econometric models are estimated to consider the different ways of accessing agricultural inputs. The first model aims to explain the overall use of agricultural inputs. The second model explains access to agricultural inputs from the NSCT, while the third model identifies the main characteristics associated with access to agricultural inputs outside the NSCT. Finally, the last model focuses on cotton producers with access to agricultural inputs from the NSCT and outside it.

Binary logit modelling is used because the dependent variables are binary. The objective is to identify some correlates of access to inputs, so we are not necessarily measuring causal effects.

The four models are specified as follows:

$$Use_i = \alpha + \beta_x.X_i + \gamma_r.Z_i + \varepsilon_i \quad (1)$$

$$NSCT_i = \alpha + \beta_x.X_i + \gamma_r.Z_i + \varepsilon_i \quad (2)$$

$$Market_i = \alpha + \beta_x.X_i + \gamma_r.Z_i + \varepsilon_i \quad (3)$$

$$Market\_NSCT_i = \alpha + \beta_x.X_i + \gamma_r.Z_i + \varepsilon_i \quad (4)$$

The variable represents the use of agricultural inputs. $NSCT_i$, $Market_i$ and $Market\_NSCT_i$ respectively represent access to agricultural inputs from the NSCT, outside the NSCT and from both sources of input supply at the same time. These are dummy variables taking value one if a farm uses the source of input and zero otherwise. X_i represents selected characteristics of the head of the cotton farm, which are the level of education, age and the number of years spent in an agricultural cooperative (Table 1). Z_i represents the characteristics of the cotton farm, namely the total number of workers employed and the prefecture where the cotton farm is located. β_x and γ_r are the unknown parameters of our model which are estimated using the maximum likelihood method.[17]

[17] For further explanation of the methodology used, please refer to Wooldridge, J. M. (2015).

Table 1. Description of the different characteristics used in the econometric regression

Variables	Unit of measurement
Use	1 = Access to agricultural inputs (from NSCT or outside) 0 =Otherwise
NSCT	1 = Access to agricultural inputs only from the NSCT 0 =Otherwise
Market_NSCT	1 = Access to agricultural inputs from the NSCT and outside the NSCT 0 = Otherwise
Market	1 = Access to agricultural inputs only outside the NSCT 0 = Otherwise
Primary	1 = Primary 0 = Otherwise
Post primary	1 = Secondary or higher 0 = Otherwise
Logarithm of age	Number of years
Logarithm of the number of years spent in a cooperative	Number of years
Permanent workers	Number of people
Farm located in the Dankpen prefecture	1 = Dankpen 0 = Otherwise

5. Empirical analysis

The first part of this section analyses the access to agricultural inputs and the main characteristics of cotton growers. The second part analyses the econometric results, aiming to identify the main characteristics associated with access to agricultural inputs according to the sources of supply.

5.1 Descriptive analysis

5.1.1 Access to agricultural inputs for cotton farmers

Overall, 93 per cent of cotton growers say they use agricultural inputs in their cotton production (Table 2). Forty-six per cent say they obtain inputs from the NSCT on credit only. In addition, 14 per cent of cotton growers obtain agricultural inputs only from outside the NSCT. This increases their cost of cotton production. Forty-eight per cent of cotton growers in the Kara region say they have difficulty accessing the agricultural inputs they need to increase their yields. The most common difficulties are the unavailability and late arrival of inputs.

Table 2. Description of cotton farmers' access to agricultural Inputs

Variables	Percentage of total cotton farmers interviewed	Number of cotton farmers
Use of agricultural inputs (NSCT or not)	93	394
Access to inputs via NSCT only	46	194
Access only outside the NSCT	14	61
Access within and outside NCST	33	139
Difficulty in accessing inputs	48	201

Source: Author's calculations based on UNCTAD data

5.1.2 Characteristics of cotton producers

Table 3 describes the characteristics of cotton growers in the Kara region. The average age of cotton growers is 42, and they range in age from 18 to 80. Fifty per cent of them are over 41 years of age. The average period of belonging to a cooperative is eleven years. This experience ranges from 1 to 42 years, and half of the cotton growers have more than 10 years of cooperative experience. Cotton growers in the Kara region employ an average of 3 people permanently, while 50 per cent of cotton growers have no permanent workers involved in their production. In terms of the level of education, 26 per cent of respondents said they had not attended school, while 35 per cent said they had primary education and 38 per cent secondary education. Twenty-five per cent of cotton growers are in the prefecture of Dankpen, which is the most represented in our sample.

Table 3. Descriptive analysis of cotton growers' characteristics

Variables	N	Average	Standard deviation	Min	Max	p1	p5	p10	p25	p50	p75	p90	p95	p99
Age	423	41.56	10.68	18	80	20	25	28	35	41	48	55	60	66
Number of years in a cooperative	420	11.19	7.70	1	42	2	2	3	5	10	16.50	21	25	30
Total number of permanent workers	414	3.19	4.61	0	20	0	0	0	0	0	6	10	13	20

Categorial variables	N	Average
No education	423	0.262
Primary	423	0.355
Post primary	423	0.383
Dankpen	423	0.255

Source: Author's calculation based on UNCTAD data

5.1.3 Distribution of access to inputs from the NSCT and access outside the NSCT

Table 4 shows that 29 cotton growers do not use agricultural inputs. Furthermore, it indicates that of the cotton farmers who do not have access to NSCT inputs, 61 have managed to obtain them from other sources. Moreover, the data shows that 194 cotton growers who have access to NSCT inputs, have not acquired inputs from other sources. The table also highlights that 139 producers adopted a hybrid approach, using inputs from both the NSCT and other sources.

Table 4. Relationship between access to inputs from the NSCT and access to inputs outside the NSCT

	Access to inputs outside the NSCT		
Acces to NSCT inputs on credit	No	Yes	Total
Non	29	61	90
Yes	194	139	333
Total	223	200	423

Source: Author's calculation based on UNCTAD data

5.2 Econometric analysis

Table 5 presents the econometric results of the logistic regression designed to identify the characteristics of cotton producers correlated with access to agricultural inputs. The four models estimated account for the differences observed according to the sources of input supply.

Table 5. Cotton grower characteristics associated with access to agricultural inputs: estimation by a logit regression

Variables	(1) Use of agricultural inputs	(2) Access via NSCT only	(3) Access to inputs only outside the NSCT	(4) Access via the NSCT and outside
Primary	0.456	0.818**	-0.876*	-0.0322
	(0.532)	(0.322)	(0.501)	(0.288)
Post primary	0.179	0.628*	-1.239**	0.167
	(0.514)	(0.322)	(0.548)	(0.293)
The logarithm of the age of the cotton farmer	0.135	0.215	-0.440	0.250
	(0.865)	(0.480)	(0.861)	(0.480)
Permanent workers	0.0883	-0.149***	0.274***	-0.0776***
	(0.0610)	0.0386)	(0.0459)	(0.0262)
The logarithm of the number of years spent in a cooperative	0.446	0.314*	-0.424	-0.0632
	(0.280)	(0.164)	(0.326)	(0.157)
Dankpen	-0.196	-3.510***	2.108***	1.129***
	(0.513)	(0.540)	(0.427)	(0.274)
Constant	0.835	-1.215	-0.762	-1.640
	(3.152)	(1.746)	(3.109)	(1.743)
Pseudo-R2	0.0350	0.2479	0.4544	0.0424
Log-likelihood	-98.668934	-213.60265	-91.267973	-247.78404
Observations	411	411	411	411

Source: Author's calculation based on UNCTAD data

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

When considering the full sample, the level of education is not a discriminating characteristic in the use of agricultural inputs. This result differs from previous work in sub-Saharan Africa (Nkamleu and Adesina, 2000; Obisesan et al., 2013; Tefera et al., 2020). However, the level of education is positively correlated with access to inputs provided by the NSCT, while it is negatively associated with access outside the NSCT. Access to inputs from the NSCT, therefore, concerns more cotton growers with a level of education higher than or equal to primary school.

The number of permanent workers, which can be seen here as a proxy for farm size, is not a discriminating characteristic in the use of agricultural inputs. This result differs from previous work (Obisesan et al., 2013; Tefera et al., 2020). However, model 3 and model 2 respectively show that farm size is positively correlated with access outside the NSCT, while it is negatively associated with access to inputs provided by the NSCT. This result can be explained by the fact that cotton growers must turn to the market to buy new

inputs if they want to cultivate areas in addition to those declared to the NSCT. Furthermore, larger farms have more resources and are therefore more likely to go to the market to obtain the necessary inputs.

The number of years spent in a production group or cooperative is not correlated with the probability of using agricultural inputs. However, there are differences according to the sources of input supply. Access to NSCT inputs on credit is positively correlated with the number of years spent in an agricultural cooperative. This result confirms the importance of producer groups in access to agricultural inputs in the cotton sector in Togo. Membership of a cooperative often comes with several advantages: training in the use of agricultural inputs, and support during the various phases from production to marketing.

As expected, the prefecture in which the cotton farm is located is a variable correlated with the use of agricultural inputs from NSCT. Cotton producers in Dankpen have less access to inputs from the NSCT but are more concerned about using inputs from the market. The prefecture of Dankpen is not very far from the border with Ghana, thus it is isolated from the regional input distribution centre in Kara. Moreover, access to the prefecture is difficult. This may help to explain the difference in demand for inputs from the NSCT.

Due to data limitations, modelling does not consider important characteristics such as the price of inputs and the distance separating the cotton grower from the nearest input seller which may help explain access to agricultural inputs. The above results should therefore be treated with caution.

6. Conclusion and recommendations

The cotton sector continues to play a vital role in the Togolese economy, given its importance especially in rural areas. Difficulties in accessing agricultural inputs, such as delays in distribution and insufficient input stocks, threaten the sustainability of the sector and the living conditions of cotton farmers. Increasing the use of agricultural inputs (fertilisers, herbicides, insecticides, seeds) would help Togo achieve its growth targets for the cotton sector. In addition, raising cotton yields would enable cotton growers to increase their income and savings capacity and reduce their vulnerability to climatic hazards and other external shocks. It would also make it possible to develop a cotton-based industry, a development that is currently limited by insufficient production of raw cotton.

This study aimed to describe access to agricultural inputs in the cotton sector in Togo and to identify the characteristics correlated with the demand for agricultural inputs, with an emphasis on differences according to sources of supply, using data from the Kara region and logit regression.

The econometric analysis showed that the level of education, the number of permanent workers, the number of years spent in an agricultural cooperative and the prefecture where the cotton farm is located, are associated with the demand for agricultural inputs. Access to inputs from the NSCT concerns more small-scale cotton growers with a higher level of education who have a long cooperative experience and who are not located in Dankpen.

Given the above discussion, Togo should focus on training cotton growers on the advantages of using agricultural inputs, targeting cotton producers with less than secondary education to increase their use of inputs and, consequently, their production. The NSCT, via the cotton farmers' group, can also improve access to agricultural inputs by ensuring that distribution points are closer to cotton growers. This can also be done by improving road conditions and creating new access points that are better distributed throughout the country. Avoiding delays in the distribution of inputs, which can be catastrophic for cotton growing, would help cotton growers to follow the technical itinerary more closely and improve their yields and hence their production.

This study focused on the features of cotton growers associated with access to agricultural inputs, mainly on the demand side, using data from the Kara region. Other supply-side factors also impact access to agricultural inputs and help to explain its weakness. The difficulties most cited by cotton growers are late delivery of inputs, insufficient stocks and deficiencies in road infrastructure. All these reasons also help to explain the low level of access to agricultural inputs.

This study represents a first attempt to better understand the characteristics of cotton farmers associated with access to agricultural inputs in Togo. The importance of this topic remains paramount for policymakers, requiring further research that could encompass other regions of Togo beyond Kara. Similar surveys could also be conducted in other cotton-producing countries, thereby contributing to the literature on the subject. By broadening the scope of research, policymakers can formulate evidence-based strategies to improve access to inputs and support the development of the cotton sector.

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8. Annex

Correlation between the different variables used in the econometric analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) use of agricultural inputs	1.000									
(2) Access to inputs via NSCT only	0.250*	1.000								
	(0.000)									
(3) Access to inputs only outside the NSCT	0.111*	-0.378*	1.000							
	(0.022)	(0.000)								
(4) Access to inputs via the NSCT and outside	0.190*	-0.644*	-0.287*	1.000						
	(0.000)	(0.000)	(0.000)							
(5) Primary	0.045	0.101*	-0.065	-0.035	1.000					
	(0.360)	(0.037)	(0.181)	(0.478)						
(6) Post primary	-0.017	0.065	-0.130*	0.018	-0.584*	1.000				
	(0.724)	(0.179)	(0.008)	(0.708)	(0.000)					
(7) Logarithm of the age of the cotton farmer	0.031	0.072	-0.096*	0.013	0.049	-0.243*	1.000			
	(0.523)	(0.141)	(0.048)	(0.794)	(0.317)	(0.000)				
(8) Permanent workers	0.078	-0.280*	0.579*	-0.089	-0.032	-0.053	-0.078	1.000		
	(0.113)	(0.000)	(0.000)	(0.069)	(0.512)	(0.285)	(0.113)			
(9) Logarithm of the number of years spent in a cooperative	0.089	-0.041	0.114*	0.006	0.011	-0.171*	0.401*	0.160*	1.000	
	(0.067)	(0.405)	(0.020)	(0.901)	(0.823)	(0.000)	(0.000)	(0.001)		
(10) Dankpen	0.009	-0.495*	0.485*	0.167*	-0.083	-0.127*	-0.064	0.353*	0.235*	1.000
	(0.859)	(0.000)	(0.000)	(0.001)	(0.089)	(0.009)	(0.189)	(0.000)	(0.000)	
*** p<0.01, ** p<0.05, * p<0.1										