

# Contract Farming on Farmers' Income: Empirical Evidence from Smallholder Farmers in Magude District, Southern Mozambique

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## ABSTRACT

The ability of farmers to integrate into markets is a key factor in increasing, income, food security and well-being of the farmers. One of the ways of integrating smallholder farmers into agricultural markets is the contract farming which, since the beginning of the second half of the 20th century, has been experiencing significant expansion worldwide. Despite the significant expansion of contract farming, the socio-economic impacts of contract farming are not sufficiently studied in Mozambique. This study aims to understand the effect of contract farming on incomes of farmers. It used open-ended questions, and individual discussions with 100 farmers (50 with contracts with Xinavane mill, and 50 without contracts) randomly selected by the convenience and purposive sampling method and structured questionnaires in 5 farmers' associations in Magude district, southern Mozambique to collect household data and information. Collected data was analyzed using the STATA computer package, and t-tests were performed to compare income of contracted farmers with income of non-contracted farmers. Results indicate an increase of around 36 % in farmers' incomes between 2015 and 2106 crop seasons, and significant differences on farmer's income of farmers enrolled with contract farming compared to the farmers without contract farming. This suggests that vertical integration through contract farming is key for increasing income. To boost the effect of contract farming on farmers' well-being, emphasis must be placed on overcoming technological and institutional deficiencies. The adequate implementation of these policy recommendations poses a significant challenge for the agricultural sector in Mozambique

**Keywords:** Income, Agriculture, Contract farming, Smallholder farmers.

## RESUMO

A habilidade dos produtores de se integrarem nos mercados é um fator essencial para aumentar a renda e melhorar a segurança alimentar e o bem-estar do agricultor. Uma das formas de integrar os pequenos agricultores aos mercados agrícolas é a produção por contrato que, desde o início da segunda metade do século XX, vem experimentando uma expansão significativa em todo o Mundo. Apesar da expansão significativa da produção por contrato, os impactos socioeconómicos da produção por contrato não são suficientemente estudados em Moçambique. O presente estudo visa compreender o efeito da produção por contrato na renda dos produtores. Usamos perguntas abertas e discussões individuais com 100 agricultores (50 com contratos com a Açucareira de Xinavane e 50 sem contratos) escolhidos aleatoriamente em 5 associações de produtores no distrito de Magude, sul de Moçambique para colectar dados e informações sobre os agregados familiares. Os dados colectados foram analisados usando o pacote estatístico STATA, e testes t foram realizados para comparar a renda dos agricultores contratados com a renda dos agricultores não contratados. Os resultados indicam um aumento de cerca de 36 % na renda dos produtores entre 2015 e 2016, e diferenças significativas na renda dos produtores com produção por contrato e os produtores sem contrato, sugerindo que a integração vertical através da produção por contrato é fundamental para aumentar a renda. Para aumentar o efeito da produção por contrato no bem-estar dos agricultores, deve-se enfatizar a superação das deficiências tecnológicas e institucionais que

enfrentam. A implementação adequada destas recomendações de políticas representa um desafio significativo para o sector agrário em Moçambique

**Palavras chave:** Produção por contrato; Agricultura; Xinavane; Renda.

## INTRODUCTION

In Mozambique, agriculture sector has been the largest contributor to economic growth, and it has been the main source of livelihoods for more than 80% of the population, especially in rural areas. In 2018 the sector contributed with 24.5% to the country GDP (World Bank, 2018). One popular policy proposal among donors and multilateral agencies is for recipient governments to facilitate the expansion of contract farming (Eaton & Shepherd, 2001; Bellemare & Bloem, 2018) wherein firms support farmers during the production and/or marketing process by providing inputs, technical support, and secured output markets. Contract farming has been used in poultry farming, and in production of many commodities such as tobacco, bananas, tea, oil, sugar, rubber, milk, fruits and vegetables (Minot, 1986). Contract farming is often seen as a means of spurring the development of an agribusiness sector, by improving the quality of products along the value chains, and improving technical efficiency in production and integrate smallholder farmers into the global and national markets and the modern economy (Eaton & Shepherd, 2001; Kirsten and Sartorius, 2002; Birthal et al., 2008), and thus launch the structural transformation (Bellemare & Bloem, 2018)<sup>1</sup>.

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<sup>1</sup> In this study, the term “Contract farming” is equivalent to what, is called “Outgrower scheme” (Minot, 1986).

However, in several developing countries, smallholder farmers face many difficulties to be integrated into agricultural markets. Factors underlying this difficulty include: low surplus capacity, limited access to productive and financial assets (credit and insurance), insecure land tenure, inadequate market infrastructure (roads, communications, energy and other), the deficit in the capacity for conservation and agro-processing of products, the weak organization and capacity for negotiation, the asymmetry of information on markets, the limited geographical coverage of the commercial network and the oligopsony (Barrett et al., 2012; Benfica & Mather, 2013; Mosca, 2014; Cunguara & Garrett, 2015).

Since the beginning of the second half of the 20th century, contract farming has been experiencing significant expansion worldwide. This expansion is associated to the growing demand for agricultural products (due to rapid demographic growth, increasing level of income urbanization, and the industrialization process), increasing importance of quality, standardization and consistent supply of products, increasing liberalization of national and international agricultural markets, improvement of transport and logistics systems, and progress in new information and communication technologies (Kirsten and Sartorius, 2002; Prowse, 2012).

A body of empirical literature — summarized in Prowse (2012); Bijman (2008); Kirsten and Sartorius (2002) and Bellemare & Bloem (2018)—has investigated the socio-economic impacts of contract farming. In general, findings are mixed with studies pointing towards both positive and negative effects, which highlights the diversity that exists in terms of commodities involved, contracts offered, and regions studied (Ba et al., 2019).

For some authors, contract farming represents an important mechanism for supporting smallholder farmers

to overcome barriers faced in accessing agricultural markets, such as the reduction of uncertainties and transaction costs, access market information, technical assistance, improved technologies and credit, integration into new markets, increased economies of scale, reduced marketing risks and increased production, which translates into an increase in income levels and farmer's well-being (Prowse, 2012; Bijman, 2008; Kirsten and Sartorius, 2002;). Others consider contract farming as a strategy used by companies to ensure cheap labor and transfer production risks to smallholder farmers, taking advantage of an uneven negotiating power (Singh, 2002; Porter and Phillips-Howard, 1997; Little and Watts, 1994; Glover and Kusterer, 1990).

The contract farming, which is the subject of this study, is practiced by Xinavane mill - a company dedicated to purchase and process of sugar cane from around 2500 local producers (27 farmers' associations and 67 individual farmers) in Manhiça and Magude districts, southern Mozambique. Contract arrangements between smallholder farmers' associations and the Xinavane sugar mill set the conditions for sugarcane production, including payments, loans and access to infrastructure (Benfica et al. 2002).

In spite of modest contribution of smallholder farmers to sugarcane production (approximately 7%), this production model is gaining ground as sugar estates seek opportunities to expand their cultivated area and attract foreign investment. Xinavane mill is also conspicuous for its leading role in the promotion of smallholder arrangements for sugarcane production

(Leite et al., 2016)<sup>2</sup>. Up to date, in Mozambique there has not been a rigorous assessment of the advantages and disadvantages of contract farming. Therefore, the purpose of this study is to analyse the effect of contract farming on farmer's income in Magude district, southern Mozambique. The importance of this research transcends the controversial debate in the academic literature, and its results can be used by decision makers at the government level for the design or reformulation of policies in the agricultural sector.

## Theory framework

The cost of carrying out a transaction between buyer and seller are commonly called transaction costs. Transaction costs involve looking for information, bargaining, hiring, monitoring and enforcing results. The theory of transaction costs is commonly used to explain contract farming.

The common theoretical explanation for contract farming is based on Transaction Cost Economics (TCE), of Oliver Williamson (1985), one of the branches of the New Institutional Economics (NIE). The central idea of the NIE is that all transactions between economic actors involve costs. The important explanatory factors of the NIE are the characteristics of the transaction, particularly the investments involved and the uncertainty faced by buyers and sellers (Bijman, 2008). NIE differs from neoclassical economics in its emphasis on decision in conditions of uncertainty, not only in relation to the natural environment,

but also in relation to how other people and organizations will behave.

Transaction Costs are of different forms and are generally the result of market inefficiency, namely information uncertainty and/or asymmetry. Since contract farming involves costs for both producers and the contractor, those costs must be less than the benefits, and the positive results of the costs and benefits of the contract farming must be greater than other arrangements for buying and selling products (Bijman, 2008).

In order to reduce transaction costs, agents make use of appropriate mechanisms to regulate a given transaction, called "governance structures". Governance structures are distinguished by the levels of control and incentive they exercise over the parties (Williamson, 1985). Governance structures can be classified on a continuum ranging from spot market to hierarchy (or vertical integration). Hybrid forms governance structures can be found in between the spot market and vertical integration, in which cooperation is built by the mutual interest of the agents involved in economic exchanges, constituting medium or long-term relationships that benefit both parties.

The type of governance structure adopted is influenced by the characteristics of the transactions. There is no, a governance structure superior to the others, but the most important factor that leads agents to minimize transaction costs is the degree of specificity of the assets. The efficiency of a given governance structure is primarily determined by its ability to respond to changes.

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<sup>2</sup> Xinavane Mill is mostly owned by Tongaat Hullett (a company based in South Africa), which owns 88% of the company's shares, with the remaining 12% of the shares owned by the Mozambican State, through

the State Participation Management Institute (IGEPE). The company has 10,000 workers, of which 6,000 are permanent.

Transaction Cost Economics explains how economic actors, faced with a set of viable institutional alternatives, choose the governance structure that ensure that their transactions are made at the lowest possible costs. Understanding the dimension of uncertainty, limited rationality, opportunism and specification of assets present in the transaction are critic aspects in TCE. Transaction costs generally increase when greater vertical coordination between sellers and buyers is needed. Thus, the analysis of the requirements of vertical coordination provides indications on the reasons for the use of particular arrangements (Bijman, 2008). Vertical coordination depends on the type of products and market demands type. Given the deficit in public information services, transaction costs are greater for smallholder farmers in developing countries; and since contractors guarantee to purchase agricultural production, contract farming can reduce uncertainty for farmers. Additionally, through the price agreement, prior to production, farmers can be assured on their income. By defining, in the contract, the type of inputs and production techniques to be used, the contractors reduce uncertainty about the quality of the products to be received (Williamson, 1985; Williamson, 1991b).

Both the NIE and TCE are based on the rejection of the substantive rationality of the model proposed by Helbert Simon. TCE propose that individual does not have complete rationality and there is information asymmetry so we must consider limited rationality and opportunism. It's not possible to establish contracts that account for all future contingencies. Limited rationality of smallholder farmers in developing countries has to do with low levels of formal education that limit the ability to adopt new technologies and innovations. Contract farming reduce the negative impact of limited rationality through provision of adequate inputs and technical assistance and regular monitoring of farmer's agricultural practices. As it is not possible to

establish a relationship that will handle all eventualities, re-negotiation is inevitable. Recurrent agreements and the associated effect on reputation, reduces the tendency for opportunistic behaviour (Williamson, 1985; Williamson, 1991a).The asset's specificity is related to the costs arising from the impossibility of alternative allocation of that asset in any other transaction. Asset's specificity creates dependency among the participants in the transaction.

In contract farming the contractor usually bets on a contract that guarantees that farmers will not practice side selling and will deliver raw materials only to the contractor.

## METHODOLOGY

### Study area

The District of Magude is located in the northern part of Maputo Province, 150 km from the city of Maputo, between the parallel 26 ° 02 '00 "south latitude and between 32 ° 17' 00" longitude (MAE, 2014). This district is crossed by Nkomati River which favors the practice of agriculture and livestock, with Magude being considered the second largest producer of cattle in Maputo Province. The private sector uses a significant part of the fertile land for agriculture and a significant part of the wage labor is from Magude. In addition to working on sugarcane plantations, the Magude population grow vegetables; manufactures and sells traditional alcoholic beverages as well as cutting and selling firewood and charcoal. A significant part of the active labor force also migrate to South Africa, where they work mainly in mines and agricultural plantations. Magude also has commercial connections with other districts and provinces in the country.

## Data collection

This is a case study, combining qualitative and quantitative approaches. Data were collected through individual interviews using a structured questionnaire. In total, 100 household heads (50 with contracts with Xinavane mill, and 50 without contracts) were chosen based on convenience or accessibility in 5 farmers' associations in Magude district for interviews. All interviewed farmers were belonging to 4 farmers' associations. The choice of non-probabilistic random selection by convenience or accessibility in this study is justified by the difficulty of obtaining lists of all producers at District level as well as funding limitations for a more comprehensive survey.

Collected data included farmer's sources of income, crops produced, cattle raised, goods and quantities sold and/or services provided and prices. Semi-structured interviews were also meant to capture farmers' and Xinavane mill manager's perceptions about contract farming. Semi structured interviews were performed between September and December, 2017

## Data analysis

Quantitative data collected was systematized using the Microsoft Office Excel software package and analysed using STATA computer package comparing farmers' income of the two types of smallholder farmers (with contract farming with Xinavane mill and those without contracts in 2105 and 2016).

## Results and discussion

### Respondent's socio-demographic characteristics

Smallholder farmers, display various socio-economic characteristics that have been reported to be crucial contributors to their decision-making processes, particularly concerning the adoption of certain farming production practices and market participation. Table 1 is regarding respondent's socio-demographic characteristics in terms of family attributes (age, gender, schooling level, and household size).

	Contract farming producers		Non-contract farming producers		Total	Pvalue <sup>3</sup>	
	M	Std	M	Std			
	ea	. De	ea	d. v.	ea	. De	
Age (years)	51	6.874	49.2	7.458	50.1	7.1935	0.2126
Gender (Male-proportion of respondents)	0.56	0.501	0.04	0.197	0.3	0.4605	0.0000
Schooling level (concluded grade)	4.36	3.778	4.3	3.529	4.33	3.637	0.9348

<sup>3</sup> the probability that a particular statistical measure, such as the mean or standard deviation, of an assumed probability distribution will be greater

than or equal to (or less than or equal to in some instances) observed results



Household size (number of people in the household)	5.68	1.2027	6.76	2.085	6.22	1.7785	0.0020
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Source: Survey data

Household characteristics are significantly different in household size, and gender. However, this result alone is not enough to conclude that these two variables influence the engagement of producers in contract farming. The major source of labor for smallholder farm production is family labor. Households engaged in contract farming with Xinavane mill have relatively more members which may be associated to subsistence pressure that may induce little investment in innovations and improved technologies (Tesema, 1988). Direct participation of women in contract farming is limited, since 96% of household without contracts with Xinavane mill were headed by women, which may be related to limited access to land and control over the allocation of labor and cash resources. For instance, Porter & Philips-Howard (1997) indicated that the impact of contract farming on women is often mediated by their relative with bargaining power within the household, and this situation may be similar of that of Xinavane mill.

In both groups (contract farmers and non-contract farmers), respondents were adults<sup>4</sup>. Between the two groups there are no significant differences in terms of age ( $p =$

0.2126), which may be associated with the fact that sugar cane production requires initial investments in terms of land and farming and irrigation equipment's, which for young farmers are limited. Contract farming in sugar cane is long-term business (e.g. sugarcane life cycle is between 6 and 8 years) for which younger farmers are less risk averse and, hence, have a less likelihood to engage<sup>5</sup>.

The farmer's education level has been described as a crucial characteristic in agricultural settings. In both groups, the average level of formal education completed by respondents is 4<sup>th</sup> grade, which is low. For contract farming producers, low levels of education can compromise the performance of specific steps that require production and marketing management skills.

### Respondent's incomes

Table 2 presents the respondent's incomes in Magude.

	Contract farming producers		Non-contract farming producers		Total		Pvalue
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	
Income 2015 (Meticais)	6655	1165	4573	6694.791	5614	1410	0.000

<sup>4</sup> In this study, we adopt 18 years and above as adult, which is recognized in Mozambican law.

<sup>5</sup> Xinavane mill has two types of contracts with local sugar cane producers (individual and producer associations). The first type of contract is the land leasing contract, which lasts for 7 years and consists of the transfer, by the producer, of his portion of land to the company, for sugar cane production. At the time of harvest, the company pays the producer a certain monetary value for the use of that land portion. This type of contract is typical for medium-sized farmers, who own more than 10 hectares. The second type of contracts applies to farmers who have their own agricultural field and are interested in producing and supplying sugar cane to Xinavane mill. In this case, Xinavane mill's role is to supply equipment and agricultural inputs (installation of irrigation system, fertilizers, herbicides and robes) and the provision of technical assistance

(field tillage and agricultural extension services); farmers, in turn, are obliged to sell sugar cane to Xinavane mill, and the company at the end deducts costs of equipment and supplied agricultural inputs. Therefore, CF model used by Xinavane mill is a *nuclear state model* (Eaton and Shepherd, 2001), as the contractor (Xinavane mill) not only buys sugar cane from independent producers, but also has its own production fields. The type of contract is a supply of resources contract (Mighell and Jones, 1963), as Xinavane mill not only guarantees to purchase of sugar cane, but also provides equipment, supplies and technical assistance to producers, in the form of credit and, after the sale of sugar cane, they must reimburse the company for the costs incurred by the company.

<sup>6</sup> Metical is currency of Mozambique. The average USD - Metical exchange rate for November 2017 was 60,251MT for each 1 USD.

Income 2016 (Meticais)	111762	13570.39	53019	4531.24	82390.5	31188.28	0.0000
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Source: Survey data

**Table 2** shows that there are significant differences on farmer's income of households heads with contract farming Xinavane mill and households without a contracts ( $p = 0.0000$ ). This trend continued in 2016, where the difference of income between the two groups of farmers is about 36% which suggests that farmer's integration in contract farming may be one of the factors that contribute to income increase. However, statistic results in this study should not be used to make the final and complete inferences regarding the influences of contract farming and other variables on farmers' income as the simple comparison of mean differences does not account for different factors and their relations.

Several studies show the existence of a causal association between income and farmer's integration in contract farming (Miyata et al., 2007; Birthal et al., 2005; Warning and Key, 2002; Simmons et al., 2005; Bijman, 2008; Watts, 1994; Silva, 2005). The observed improvement in farmer's income in this study is consistent with empirical observations by Mosca (2014) that indicates that there are social mobility's for the benefit of smallholder farmers under outgrower schemes, which are reflected in increase of cultivated areas, wage earning, increased income and use of more productive techniques. Despite this observation, we cannot conclude whether the increase on farmer's income is associated with an increase in agronomic yields or price improvements. Miyata et al. (2007), in a study in China, concluded the differences farmer's income were related to the type of crop. For apple producers farmer's income increase resulted from yields increase (presumably due to technical assistance), while farmer's income increase on income resulted from higher prices (supposedly because of better quality).

**Table 3** is about respondent's sources of incomes in Magude.

Source of income/(proportion of respondents)	Contract farming producers		Non-contract farming producers		Total		Pvalue
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	
Agriculture	1.00	0.00	1.00	0.00	1.00	0.00	Indeterminate
Livestock	0.12	0.3282	0.02	0.4985	0.027	0.4461	0.0006
Trade	0.02	0.1414	0.08	0.3880	0.015	0.3015	0.0073
Services	0.02	0.1414	0.04	0.3505	0.008	0.2726	0.0270

Source: Survey data

Agriculture is the main economic activity in Magude. Beside agriculture, household heads without contracts with Xinavane mil tend to reinforce income through a diversified portfolio of livelihood strategies such as raising more cattle eventually as a form of saving or family reproduction (for the payment of the lobolo), whose practice is common in Magude and trying to reduce the impact of market uncertainties and transaction costs. Several farmers without a contract farming with Xinavane mill referred to situations in which they were forced to consume their agricultural products, due to lack of buyers, and / or lack of means of transport for taking they sugar cane to place with relative demand, which highlights the importance of farmer's uncertainty mitigation strategies.

Trade and services are important survival strategies for families in Magude, especially for families without a contract with the Xinavane sugar mill. The fact that non-contract families are more engaged in trade and services suggests families' strategies to develop resilience against income fluctuations, where those farmers with contract farming are more market oriented and tend to have more concentrated production. This concentration may represent a diversification into higher value crops, but not a diversification into multiple crops (Mehta, 2009).



**Table 4** below summarizes farmer's satisfaction regarding contract farming. 58% of household heads with contract farming were dissatisfied with the contract elaboration process which reflect a unilateral definition of contractual terms and conditions by the company, and there has been no other option for the farmer's associations than to comply with the decisions of the Xinavane mill because smallholder farmer often have weaker bargaining position (Little and Watts, 1994; Glover, 1987; Porter and Phillips-Howard, 1997; Warning and Key, 2002; Dorward et al., 1998). The biggest complaint from producers has to do with the cost of transportation that they consider high. Producers suggest that they can use their transportation to minimize the cost of transportation. Strengthening farmer's negotiating power has been constrained by the lack of other sugar cane outgrowers in Magude as well the lack of other farmer's stable sources of income. Despite this, a significant number interviewees considered themselves satisfied with contract farming, suggesting that, income improvement can be one of the biggest gains associated with contract farming s' satisfaction.

Satisfaction level	Very satisfied	Satisfied	Indifferent/ Do not know	Unsatisfied
Contracts elaboration process	0%	10%	32%	58%
contract compliance by Xinavane mill	28%	64%	4%	4%
Xinavane mill support during the sugar cane production process	16%	80%	4%	
Communication process with Xinavane mill	10%	74%	10%	6%
The way Xinavane mill determines the price of sugar cane	10%	16%	70%	4%

Period for settlement-payment of contracts	20%	24%	56%
Comparison of income level before and after entering contract farming with Xinavane mill	24%	76%	

Source: Survey data

Farmers were also dissatisfied with the delay in payment after the sugar cane was delivered to the factory for processing, but even in the midst of these differences, farmers preferred a friendly relationship with Xinavane mil because their main interest was contracts maintenance which guarantee them sugar cane market and income stability.

## Conclusions and recommendations

Household characteristics are significantly different in household size, and gender. However, this result alone is not enough to conclude that these two variables influence the engagement of farmers on contract farming. Age and financial constraints, land farm size, has been prominent socioeconomic characteristics influencing participation on contract farming. Direct participation of women in Contract Farming is limited which may be associated limited access to land and control over the allocation of labor and cash resources. Farmers not engaged in contract farming are more involved in trade and services suggesting families' strategies to develop resilience against income fluctuations, where those farmers with contract farming are more market oriented and tend to have more concentrated production.

Farmer's integration in contract farming may be improve farmer's income. However, statistic results in this study should not be used to make the final and complete inferences regarding the influences of contract farming and other variables on farmers' income as the simple comparison of

mean differences does not account for different factors and their relations. The observed increase on farmers' income may be associated to three factors, namely assured access to the market, access to a stable source of income, and the reduction of production and marketing risks. Contract farming in Xinavane mill was inclusive to all smallholder farmers, taking in account that even farmers with less than 5 hectares were involved in the mechanism of contract farming.

Based on the results of the study it is recommended: (a) The Xinavane mill reflects on the possibility of including more local producers, especially young farmers in the contract farming schemes; (b) Xinavane Mill expands the dialogue with farmers regarding the mechanism of price determination. This, in turn, will bust trust between the two parties; (c) government authorities to promote contract farming initiatives through the establishment of a favourable business environment to attract more companies, expansion of labor dispute arbitration offices, provision of market information, public investments in production and marketing support infrastructures and other policy measures. The adequate implementation of these policy recommendations poses a significant challenge for the agricultural sector in Mozambique.

## Compliance with Ethical Standards:

### Ethics declarations

Conflict of interest

The authors declare that they have no conflict of interest.

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