# Does contract farming improve Cassava production, price determination and farmer's income in Ruhango district in Rwanda?

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## Abstract

This study analyses the impact of contract farming on cassava production, price determination and farmer's income in Ruhango district in Rwanda. It uses a participatory assessment method using an interactive tool commonly named "it takes two to tango". Data were collected from cassava farmers and a Cassava Processing Plant employees. The findings show that the contract farming did not contribute to cassava production improvement. The contract farming did not help in the availability and accessibility of agricultural inputs such as planting material and fertilizer used in cassava farming. Findings of the study also show that the contract farming did not lead to mutual cassava price determination. Regarding the income, farmers indicated that the contract farming did not lead to the increase in income. The Cassava Processing Plant should support the farmers in improving cassava production through the training on land preparation, management of the planting material, fertilizing, cropping, weeding and harvesting. The price of fresh cassava should be fully determined together by the farmers and the Cassava Processing Plant. Improvement in cassava production and mutual price determination should help the farmers to have consistent income.

**Key words:** Contract farming, Cassava production, Cassava Processing Plant, Rwanda

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## Introduction

Smallholdings constitute a majority of primary agricultural production units in developing countries and contribute to national economies. Despite their important role in food production, smallholders face a number of challenges including unreliable and costly inputs (Smalley, 2013; Ton, 2018). They also tend to lack credit facilities and markets for their produce since local markets can be changeable (Gumataw et al., 2013; Otsuka, et al, 2016). One of the ways to overcome these setbacks and access stable market opportunities for smallholder farmers is to go into contract farming which guarantees the market for their agricultural produce and other advantages such as increased bargaining power and easy access to agricultural inputs like seeds, feed or fertilizers (Mwambi et al., 2016; Otsuka, et al, 2016; Ton, 2018)).

Contract farming is an agreement between farmers and a contractor for the production and supply of products under forward agreements, frequently at predetermined prices (FAO, 2017). This method benefits farmers through increased productivity and income, while simultaneously reducing the cost and risks associated with production (Otsuka, et al, 2016; FAO, 2017). Contract farming can reduce poverty in farming communities (Fayet and Vermeulen, 2014; Mwambi et al., 2016). Particularly, in developing countries the advantages of contract farming include the promotion of the access to higher income, shifting from low-nutritious foods to high-nutritious foods, liberalised markets, improved transport and logistics accessibility, and using modern technology in agriculture (Reardon and Timmer, 2014; Otsuka, et al. 2016; FAO, 2017). However, contract farming has experienced weaknesses. Farmers participating in contract farming may be exposed to insecure monopolistic farming system for selling their crops, limited bargaining possibility, delayed and reduced payments, possibility of rejecting their products, forced use of unfamiliar technologies, and the possibility of finding themselves excluded from the arrangements (Otsuka, et al, 2016; FAO, 2017).

The contract farming may be written or verbal (Prowse, 2012). The written contract is most known and has a legal advantage which facilitates its enforcement and resolution of conflicts that can arise during its implementation. The verbal contract is also useful and has contributed much in agribusiness although its binding powers are associated with a grey area of enforcement (FAO, 2017). In both cases, the agreement specifies the conditions of provision of resources, terms of production, marketing conditions, use of land and legal title to the crop. The smallholdings is normally defined as a land not exceeding 20hectares (Eastwood et al., 2010). In Rwanda, where the average land size is 0.4 hectares per household and agriculture contributes around 80% to the national economy (NISR, 2014), smallholdings are defined as farm having below 0.5 hectares and constitute about 57% of total farms (MINECOFIN, 2007). Consequently, to boost food production, increase the farmer's income and improve nutrition within such farming system characterised by the scarcity of farming land require the best agricultural policies, programs and strategies. The Crop Intensification Program (CIP) was hence setup for facilitating the inputs use (improved seeds and fertilizer), land use consolidation, provision of extension services and improvement of post-harvest handling and storage mechanisms (MINAGRI, 2012). The CIP program focuses on maize, wheat, rice, Irish potato, beans and cassava crops (MINAGRI, 2012).

Like other crops, cassava is mainly grown in smallholdings counting for 10% of arable land (MINAGRI, 2012). Due to Cassava Mosaic Virus (CMV) and Cassava Brown Disease pests which drastically reduced the cassava production between 2004 and 2007 (Night et al. 2011), new varieties more resistant to CMD and with yield three times the yield of old varieties have been introduced to farmers (USAID Rwanda, 2010). The yield for new varieties can reach 30 to 40 tons per ha without fertilizer application (USAID Rwanda, 2010). The measures taken resulted in notable increase of 45.2 % of cassava production between 2007 and 2010 (World Bank, 2014). The increase in yield led to the establishment of a Cassava Processing Plant with the capacity of processing 144 tons of fresh cassava into 48 tons of cassava flour per day in Ruhango district (Ruhango district, 2013). The Cassava Processing Plant entered into verbal contract farming approach

with farmers for improving cassava production, relying on a sustainable source of raw cassava produce and help farmers to raise the income. However, it is working under its full capacity because of low supply of fresh cassava leading to the production of 15 tons of cassava flour per day. This article aimed at analysing the impacts of contract farming on cassava production, price determination and farmer's income in Ruhango district in Rwanda.

## Materials and Methods

This study was conducted in Ruhango district in Southern province of Rwanda in 2017. Ruhango district covers an area of 626.8 km² and has a population of about 319,885 making a density of 510 inhabitants per square km (Ruhango district, 2013). The essential economic activities include agriculture where cassava is one of the major crops, industry and commerce, tourism and handcraft. Cassava covers around 13,271ha of arable land in the district and its yield is around 35 tones per ha (Ruhango district, 2013). A participatory assessment using the tool "It takes two to tango" (Schrader et al., 2012) was conducted to analyse the impact of contract farming on cassava production, price determination and farmer's income. Forty seven (47) respondents comprising 38 farmers supplying cassava to the Cassava Processing Plant and 9 employees of the Plant were requested for scoring the statements describing the role of contract farming on a 4 points Likert scale i.e. "0= Strongly disagree", "1=Disagree", "2=Agree", "3=Strongly agree". An even number of possibilities was given to respondents for making sure that they clearly indicate their positive or negative position on the statement. Independent sample t-test for unequal variances at 95% confidence level was calculated to determine the agreement and disagreement on each statement between farmers and employees. A cut-off point between disagreement and agreement levels was fixed at 2. An average score below 2 shows poor agreement, hence poor impact of contract farming while the average score above 2 shows a positive agreement which implies good impact of contract farming.

## Results and Discussion

### Contract farming and cassava production

The data analysis results in table 1 show that the difference in overall mean scores by both farmers and factory employees is less the average score and is not statistically different ($p = 0.350$). The findings imply that there is no impact of contract farming on cassava production. There is no impact of contract farming on fertiliser use, determination of the cost of production, availability of affordable inputs to farmers. For farmers, contract farming has no impact on availability of sufficient and good planting material and did not help in their training in cassava cultivation by the Cassava Processing Plant. The findings contradict the views of Otsuka, et al.(2016) and FAO (2017) that the contract farming benefits farmers through increased productivity.

**Table 1. Impact of contract of farming on cassava production**

| | Production and Productivity | Mean score (max. 3) | | t-test | df | 95% p-value |
|---|---|---|---|---|---|---|
| | | Farmers | Factory | | | |
| 1 | Sufficient planting materials available to farmers | 1.58 | 2.00 | -3.59 | 37.00 | 0.001 |
| 2 | Farmers use fertilizers | 0.55 | 1.00 | -1.33 | 4.85 | 0.240 |
| 3 | Farmers are trained in cassava cultivation by Cassava | 1.10 | 2.12 | -6.08 | 20.23 | 0.001 |
| 4 | Cassava yield increases | 2.00 | 2.00 | 0.00 | 36.00 | 1.000 |
| 5 | Farmers are aware of the production cost of 1kg of fresh | 0.86 | 1.44 | -2.15 | 12.04 | 0.052 |
| 6 | Limited farms size | 1.23 | 1.50 | -1.22 | 11.56 | 0.246 |
| 7 | Farms are suitable for cassava crop | 2.68 | 2.33 | 1.91 | 11.60 | 0.081 |
| 8 | Availability of affordable inputs to farmers | 1.88 | 1.66 | -1.59 | 9.65 | 0.143 |
| 9 | Farmers obtain good planting materials | 1.89 | 2.00 | -0.42 | 10.05 | 0.682 |
| **Overall mean score** | | **1.53** | **1.78** | **-** | **13** | **0.350** |

Source: Data from survey of this study

The Cassava Processing Plant should support the farmers in improving cassava farming. The factory should focus on the promotion of fertiliser and good planting material use, land preparation, management of the planting materials, fertilizing, cropping, weeding, harvesting and post-harvest handling and determination of production cost. Trained farmers would be more able to improve cassava farming and raise cassava productivity and production. This could result in cassava production increase which would help the Cassava Processing Plant to receive enough raw fresh cassava and to operate at its full capacity.

**Contract farming and cassava price determination**

The results in table 2 show that there is no difference in overall mean scores of respondents on cassava price determination (p= 0.013). The receipt of the same price and the existence of side buyers were scored above the average score by farmers. Insufficient knowledge on the production cost and price of cassava flour, limited participation in fresh cassava price setting, not respecting the payment schedule and lack of trust in factory weighing balance and satisfactory price were scored less the average score (2) by farmers. Consequently, the farmers could be more interested in searching for alternative buyers of their fresh cassava despite their agreement with the factory. This could be justified by their high knowledge on the existence of other buyers of fresh cassava (their score (2.89) is closer to maximum score (3)). Not respecting the payment schedule could imply that the farmers would search for a buyer paying on time given that most of the time farmers are in urgent need of cash because of limited sources of income. The factory employees scored below the average score the participation of farmers in price setting and less cassava consumed by farmers compared to cassava sold. The factory employees also indicated that there are side buyers of fresh cassava and the payment schedule is respected. Although, the contract farming allows the farmers to selling at good price determined through mutual agreement (Otsuka, et al, 2016), the findings show that farmers are not participating to cassava price determination.

**Table 2. Impact of contract farming on cassava price determination**

| No | Market and price setting | Mean score (max.3) | | t-test | df | 95% p-value |
|---|---|---|---|---|---|---|
| | | Farmer | Factory | | | |
| 1 | I know the production cost of 1kg of cassava flour paid by the Cassava Processing Factory | 0.62 | 2.50 | -8.98 | 10.40 | 0.001 |
| 2 | Farmers know the price the factory sells 1kg of cassava | 1.52 | 2.66 | -5.31 | 19.98 | 0.001 |
| 3 | Cassava auto-consumed is greater than the fresh cassava | 0.71 | 0.66 | 0.17 | 9.75 | 0.864 |
| 4 | There are buyers of fresh cassava other than the Factory | 2.89 | 2.77 | 0.75 | 9.96 | 0.469 |
| 5 | Farmers participate in price setting | 0.08 | 1.88 | -14.42 | 12.78 | 0.001 |
| 6 | Farmers are happy with the price offered by the Cassava | 0.21 | 2.00 | -9.36 | 13.54 | 0.001 |
| 7 | The Processing Factory pays farmers on time | 1.29 | 2.22 | -4.65 | 23.13 | 0.001 |
| 8 | All farmers receive the same price | 2.16 | 2.66 | -2.37 | 19.38 | 0.027 |
| 9 | Farmers have trust in the Cassava factory's weighing | 1.10 | 2.77 | -7.26 | 32.65 | 0.001 |
| **Overall mean score** | | **1.18** | **2.24** | **-2.79** | **15** | **0.013** |

**Source: Data from survey of this study**

The price of fresh cassava should be determined together by farmers and the Cassava Processing Plant. The mutual determination of the price is necessary for avoiding the thinking that one party is gaining more in the deal than the other. The Cassava Processing Plant should also share the information related to processing cost. This information would help the farmers to understand that the trade is fair and decide about their supply of fresh cassava. The information on the price of the cassava flour at the factory is also necessary for increased transparency between the farmers and the factory. The Cassava Processing Plant should take measures for raising the farmers trust in its business in general and particularly the trust in weighting balance, as some are not knowledgeable about the functioning of the balance. Trust between partners in business and clients and business owner is necessary for the success of the business.

**Contract farming and farmer income**

The results in table 3 show that the overall mean score for farmers was 1.4 times less than the Cassava Processing Plant employees score and the difference was statistically significant. According to farmers, the contract farming did not help in improving their income. The income is not steady, the advice from the factory is poor, there is a poor help in getting loans to invest in farming activities. These three variables are so critical to cassava growing improvements which could result in cassava production increase and thus farmers' income increase. These results contradict the findings of (Reardon and Timmer, 2014; Otsuka, et al., 2016; FAO, 2017) who found that the contract farming promotes the access to higher incomes in developing countries. The permission to sell to the Cassava Processing Plant, investing the money from cassava selling and the guaranteed market were scored above the average score which explains their good impact on farmer's income.

**Table 3. Impact of contract farming on farmer income**

| | Farming agreements | Mean score (max. 3) | | t-test | df | 95% p-value |
|---|---|---|---|---|---|---|
| | | Farmer | Factory | | | |
| 1. | Cultivating cassava provides a steady income | 1.28 | 2.37 | -4.83 | 15.14 | 0.001 |
| 2. | The Cassava processing Plant advises farmers on cassava farming | 0.55 | 2.12 | -6.22 | 10.66 | 0.001 |
| 3. | Each farmer is allowed to sell fresh cassava to The Cassava Processing Plant | 2.52 | 2.88 | -2.53 | 20.16 | 0.020 |
| 4. | The money from cassava selling are used in cassava production and/or other activities generating income | 2.05 | 2.71 | -3.21 | 9.26 | 0.010 |
| 5. | Cassava producers are helped to get loans for their farming activities | 1.43 | 2.25 | -3.04 | 9.32 | 0.013 |
| 6. | Farmers are happy with cassava market guaranteed by The Cassava Processing Plant | 2.84 | 2.77 | 0.40 | 10.81 | 0.693 |
| **Overall mean score** | | **1.78** | **2.52** | **-1.99** | **6** | **0.09** |

The contract farming should help the farmers to have consistent income from selling their fresh cassava to the Cassava Processing Plant. This could help the Cassava Processing Plant to rely on sustainable fresh cassava supply and operate at its full capacity. Therefore, training farmers in cassava farming by the Cassava Processing Plant would lead to yield increase and thus the income increase from selling the increased fresh cassava produce. Training and advising farmers could also help the Cassava Processing Plant to give recommendations to farmers in line of meeting the demand either in quality and/or in quantity. Furthermore, the Cassava Processing Plant should always be able to accept the supply from the farmers it is contracting with. If it happens for the Cassava Processing Plant to obtain larger quantities of cassava from farmers, it should rely on a third party for continued market guarantee of its suppliers and respect of the agreement. The Cassava Processing Plant should also help farmers to get loans given that loan access was reported by the farmers to be low. The help in getting loans could be done through advocacy, pointing out the importance of cassava farming in food security and income and the importance of agriculture sector in the national economy.

## Conclusion

The objective of this study was to analyse the impact of contract farming on cassava production, price determination and farmer income in smallholdings in Ruhango district in Rwanda. The farmers were not advised on or supported in cassava farming. The contract farming did not lead to mutual cassava price setting. The price of the fresh cassava was not mutually determined by contracting parties. There has been no increase in cassava productivity and production and farmer's income. Overall, contract farming did not impact positively cassava production, price determination and farmer's income. Therefore, the Cassava Processing Plant should support the farmers in improving cassava cultivating by focusing on fertiliser and good planting material use. The price of fresh cassava should be fully determined together by the farmers and the Cassava Processing Plant. The verbal contract farming should be replaced with the written farming contract which is more binding.

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