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Factors influencing seed cotton marketing decisions by smallholder farmers in Zimbabwe

Njanji Maxmore[1]
[iD] **Parwada Cosmas[2+]**

[1]*Women's University in Africa, Faculty of Agricultural Sciences, P.O. Box GD 32, Greendale, Harare, Zimbabwe.*
Email: Mnjanji1@gmail.com
[2]*Tugwi Mukosi Multidisciplinary Research Institute, Midlands State University, P. Bag 100, Zvishavane, Zimbabwe.*
Email: cparwada@gmail.com

(+ Corresponding author)

ABSTRACT

Economic reforms such as the liberalization of export and processing-linked marketing channels have encouraged farmers to produce more. Unfortunately, cotton production in Zimbabwe has been declining regardless of such interventions. Why is the production declining despite these interventions including the government-free inputs and supported extension services? Cotton marketing is one of the main factors that influence overall quantities of a commodity to be produced but the practices and behavior of farmers are relatively unknown and unpredictable in the cotton markets. Therefore, this study was to explore factors influencing smallholder farmers' cotton marketing decisions in three cotton-producing provinces of Zimbabwe. A representative sample of 1080 cotton farmers were randomly selected from these provinces and a double hurdle model was used to evaluate market participation and intensity guided by probit model and censored tobit model respectively. Results showed that the decision to participate in cotton marketing was exclusively influenced by experience in cotton production while the intensity of cotton marketing was exclusively influenced by household labour and access to information. Market prices did not significantly ($P<0.05$) influence both the participation and intensity of cotton markets. The source of inputs and affiliation to marketing associations influence both marketing decisions. It is recommended that the government of Zimbabwe should revise the existing cotton marketing policies to encourage many buyers into cotton markets. The establishment of cotton marketing hubs can increase cotton marketing participation and intensity through increased access to decentralised marketing options.

Contribution/Originality: In Zimbabwe, the cotton market intensity and participation is still complex as it is affected by many factors. This study showed that there are few participants in the cotton marketing industry, indicating the necessity of setting up several cotton marketing centers throughout Zimbabwe's rural areas.

1. INTRODUCTION

Cotton production is an important source of livelihood among resource constrained small-holder farmers especially in the drier areas of Zimbabwe (Cotton Indaba Taskforce, 2012; Njanji & Parwada, 2023). Since 1980, Zimbabwe has strategically made some economic reform strategies e.g the structural adjustment programs aiming at achieving a liberalized market-oriented economy that also caters for the smallholder farmers (Tschirley et al., 2010). These initiatives provided space for small-scale farmers to produce a more diverse basket of products and participate in more rewarding markets for income security gains (Competitions and Tariffs Commission, 2013). Surprisingly, all these initiatives have not raised visibility of the smallholder farmers in the high-end markets in many sub-Saharan Africa nations e.g Zimbabwe.

Although many variables affect commodity pricing, the consuming countries' economic swings are particularly noticeable when it comes to commodities like cotton and tobacco. Consequently, commodity exporters are affected by the ups and downs of industrial country production (Mutambara & Mujeyi, 2021). When severe measures are implemented to lessen inflationary pressures in the importing nations, prices can typically decrease. The documented consequences of slowing economic growth lead to a sharp decline in the demand for raw resources. In addition, changes in meteorological circumstances might cause good or poor harvests, which can affect commodity prices (Njanji & Parwada, 2023). The erratic commodity markets cause misallocation of resources and interfere with investment planning (Tschirley et al., 2010). Market volatility does not accurately reflect the relative profitability of different investment avenues. As a result, risk-averse investors will not put their money into industries with significant volatility. On the other hand, low price instability would likely favor long-term investment in productive assets, but significant price instability of a country's commodity exports affects the rate of domestic savings and can favor investments for short gain (Kabwe et al., 2018). Then private investment may be steered toward domestic projects with short-term profitability rather than into riskier endeavors, even though the latter may reflect the country's comparative advantage (Cotton Indaba Taskforce, 2012). Because of the ensuing fluctuations in capital and intermediate product imports, commodity price volatility further impedes economic growth (FAO, 2019).

Strategies adopted for cotton production and developing marketing systems and how they have been used in Zimbabwe over time still requires readjustments to align to the realities of an ailing economy (FAO, 2012). This research was designed to centre more directly to cotton marketing among smallholder farmers. Its focus was on marketing strategies and the possible reforms that can be done to reclaim the significance of the cotton enterprise in economic development. The view was to pin-point and unlock the production limitations and then relate them to the marketing environment challenges encountered by the cotton producers. This will necessitate the thinking of possibilities of forging ahead and current opportunities linkages within the conceptual framework which guided this study. A handful of researches were done to explore the cotton marketing in southern Africa (Machethe, Jagwe, & Ouma, 2008; Musara, Musemwa, Mutenje, Mushunje, & Pfukwa, 2018; Savvides, 2000). In Zimbabwe, the cotton market is not stable due to factors like inflation and disparities between the formal and informal USD exchange rates. Therefore, there is a need to continuously look into production-marketing dynamics for cotton. It therefore necessary to explore the drivers of markets and marketing participation decisions among the smallholder cotton producers in Zimbabwe. The objective of this study was therefore to investigate the factors that influence cotton marketing participation and intensity among smallholder farmers in Zimbabwe. Once these determinants of the preferred marketing channels are known, appropriate policies on cotton marketing will be designed and farm level cotton production strategies.

2. METHODS

2.1. Study Site

Three major cotton-producing provinces were included in the study and these provinces were Masvingo, Mashonaland Central, and Midlands. The distances between Midlands provincial town center (Gweru) and Harare's city center are 274 km to the southwest, 293 km to the south, and 88 km to the northwest, respectively, to Masvingo town center and Mashonaland Central provincial town (Binduira town center). In these provinces, agriculture, especially cotton production is the main source of income.

2.2. Study Design

For econometric estimates, the research employed quantitative techniques under the positivist paradigm. According to Creswell and Creswell (2018) the quality of research outputs is increased when a single research approach is used and concentrated on. Then, as our goal was to comprehend the practices and behavior of relatively unknown and unpredictable farmers in cotton markets, we decided to utilize an exploratory research approach. Well-

organized farm surveys were used to gather primary data from the three selected provinces. The survey data was collected between November 2021 and March 2022. Utilizing quantitative questionnaires, the surveys conducted interviews with randomly chosen cotton farmers based on the primary sources of production inputs in the provinces under consideration (government assistance, self-funding, or contracts from other organizations).

According to the data obtained from the COTTCO, each of the three selected provinces had average 220000 registered smallholder cotton farmers by 2021. The sample size was then determined from a known population guided by Slovin formula as:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = Sample size; N = Population size and e = Confidence level (95 %).

$$n = \frac{220000}{1 + 220000(0.05)^2}$$

= 399 farmers per province

Therefore, the total number of sampled farmers was approximately 1086 farmers.

In the Muzarabani district of Mashonaland Central Province, 50 randomly chosen farmers were interviewed as part of a pre-testing process for the questionnaire. Pre-testing was crucial in helping the interviewers and the respondents recognize certain issues that might come up during data collection. COTTCO extension agents who possessed a thorough understanding of the research regions and the farms' methods for producing cotton were chosen in the pre-testing. After that, they received a week of training to help them understand the questionnaire's administration and structure. Using key informant interviews with COTTCO marketing staff, data was triangulated to verify, refute, and support conclusions to assure the findings' rigor. Focus groups with ten smallholder cotton farmers where six and four males and females respectively were conducted.

2.3. Empirical Modelling

Double hurdle model was applied in data analysis. The model was applied to determine factors that influence cotton market participation by the smallholder farmers, assuming that viable markets are pivotal to unlocking local level economic growth. Market participation decisions are commonly measured by the trade theory where the motivation is that farmers participate in selected markets so that they can enjoy a variety of consumption bundles (Bernard & Spielman, 2009). Unfortunately, the trade theory has many limitations in that even though primary motives for farmers to participate in markets are stated, identification of the exact determinants of market participation are not clear.

Following Burke, Myers, and Jayne (2015) the double hurdle model with two equations revealed two stages of market participation and intensity of market participation by cotton farmers. A probit model was used for the market participation decision as explained by Goetz (1992). A censored tobit model was then used to obtain the factors influencing choice in quantity to sell in a particular market. With a cotton farmer included in the study, the demand for market participation (MP^*), is modelled as:

$$MP_i^* = \beta^1 X_i + \mu_i$$

Where X = Determinants of the decision as captured by the function, β = The Parameter vector, and μ = The error term.

According to Ricker-Gilbert, Jayne, and Chirwa (2011) an index function to represent the two possible states of participation and non-participation was then captured as:

$$MP_i = \begin{cases} 1 & if \quad MP_i^* > 0 \\ 0 & if \quad MP_i^* \leq 0 \end{cases}$$

This implies that any cotton farmer who is rational will only participate in a market given that there is a net positive utility from the decision made, i.e., Basing on Greene (2000) the study then U p1 >U p0 modelled the variables influencing the cotton farmer's decision to participate in a market and intensify the market participation as:

$$MP_i^* = \theta z_i + \delta_i$$

2.4. Hurdle One - Market Participation

To understand the determinants associated with the first decision (hurdle) which is to either participate in a market or not, a probit model was used.

$$MPI_i^* = \alpha' g_i + \varphi_i$$

2.5. Hurdle Two - Intensity of Market Participation

Using experiences from work by Shiferaw, Kebede, Kassie, and Fisher (2015) the study used a censored tobit model to explore the factors influencing the market participation intensity decision as the second stage (hurdle) which the cotton farmer has to overcome.

2.6. Variables Included in the Model

Guided by Harmeling, Palmatier, Fang, and Wang (2017) on market participation and intensity of market participation decisions, three categories of explanatory variables were used in this study. The variables were the household characteristics, public goods available to the households and the transaction costs. The variables and their mean values are shown as in Table 1.

Table 1. Descriptive summary of variables in the model.

Variable	Variable definition	Units	Mean	Std.dev.	Min.	Max.
Dependent variables						
Cottn. partic.	Indicator variable: Whether a cotton farmer participated in a market (No=0; Yes=1)	Dummy	0.45	0.60	0	1
Cottn. intens.	Indicator variable: The quantity of cotton sold by the farmer in a year	Kg	450.13	20.12	200.0	2000.15
Independent variables						
Labour	Indicator variable: Number of household productive labour units (16-70 years) cotton at the farm gate (No=0; Yes=1)	Number	2.17	0.30	16.0	70.0
Other info.	Indicator variable: Other sources of information besides cluster cotton association (No=0; Yes=1)	Number	0.712	0.019	0	1
Res. train.	Indicator variable: The household head ever participated in agricultural research programs (No=0; Yes=1)	Dummy	0.12	0.37	0	1
Ext. train.	Indicator variable: Whether household head received any training from extension agents (No=0; Yes=1)	Number	0.10	0.18	0	1
Membership	Indicator variable: Number of farmer associations to which household members belong	Number	2.86	0.2	0.12	3.13

Variable	Variable definition	Units	Mean	Std.dev.	Min.	Max.
Cottcomarket.	Indicator variable: Sold cotton to cottco buyers (Otherwise=0; Cottco=1)	Dummy	0.9	0.32	0	1
Hsehldage	Age of household head	Years	48.78	13.74	26	88
Gender	Indicator variable: Gender of the household head (Female=0; Male=1)	Dummy	0.71	0.43	0	1
Hholdsize	Indicator variable: Number of household members	Number	4.12	2.62	3.02	9.10
Cottn. exp.	Indicator variable: Cotton farming experience in years	Number	15.46	7.12	1.53	30.27
Source. input	Indicator variable: Source of inputs (Otherwise=0; Cottco=1)	Dummy	0.92	0.001	0	1
Price	Indicator variable: Average cotton price per kg in the market	US$	0.85	0.001	0.80	0.90

About 95% of the sampled households participated in cotton marketing and sold on average 400kg of cotton per year. The results from Table 1 show that the average household size in the study area was 4 while the effective labour available per household was 2 units. The average cotton price per kg in the markets was 0.85US$.

3. RESULT AND DISCUSSION

The first-stage probit model estimates the parameters for the decision to participate in a market. The second stage censored tobit estimates factors influencing the market participation intensity for a farmer as represented by the quantity of cotton sold. After sampling the farmers, we observed that all sampled farmers were under the government aided input scheme so no self-funded and contract with another organisation. The received cotton presidential inputs from the COTTCO hence, their marketing behaviour was the same in all the three selected provinces. The output in Table 2 provides maximum likelihood estimation of both the probit market participation equation and the censored tobit goat sales equation.

Table 2. Estimates for the double-hurdle model for the sampled provinces, Zimbabwe.

Variables	Hurdle 1 (Market participation)		Hurdle 2 (Intensity of market participation)	
	Coefficient	p-value	Coefficient	p-value
Labour	0.032(0.137)	0.256	1.523**(0.515)	0.011
Other info.	1.640(2.006)	0.211	2.245***(1.062)	0.003
Res. train	0.442(0.643)	0.143	0.035(0.216)	0.136
Ext.train	0.054(1.301)	0.271	0.062(2.114)	0.253
Membership	1.004**(0.612)	0.017	1.332***(1.022)	0.031
Cottcomarket	1.532***(0.718)	0.001	2.016***(1.211)	0.002
Hsehldage	1.742**(0.546)	0.041	1.845***(1.215)	0.008
Gender	0.235(0.242)	0.632	0.356(0.234)	0.761
Hholdsize	0.563(0.453)	0.109	0.431(0.123)	0.831
Cottn.exp	1.022*(0.672)	0.021	-0.017(0.217)	0.423
Source. input	1.663(0.562)	0.006	1.034***(0.598)	0.004
Price	0.236(0.157)	0.264	2.053(0.724)	0.852

Note: ***; ** and * indicate p-values significant at 1%, 5% and 10% levels respectively.

3.1. Cotton Market Participation Choice

Results showed that, the age (*Hsehldage*) of the principal decision maker in the household had a positive and significant relationship with the decision to participate in a market. Older household decision makers participated in cotton markets more than younger household decision makers Table 2. Age is usually positively correlated to the level of experience, hence older and more experienced cotton farmers who have been into cotton production for long

would have interacted with many cotton buyers. This gave them experience to judge the performance of any locally available cotton buyers so were more likely going to participate in the available market outlets. These experienced farmers are aware of the risks and opportunities associated with the various cotton market outlets and have devised mechanisms to absorb the risks while making profits (Mutambara & Mujeyi, 2021). Some discussions with stakeholders in the three studied provinces showed that younger farmers were not satisfied with COTTCO as the main market due to the low prices offered and were not paid on time. Our results were observed by Musara et al. (2018) who also reported that the age of the farmer positively and significantly influenced the likelihood of marketing sorghum in a semi-arid area of Zimbabwe. The membership to a farmer association positively and significantly influenced the market participation and intensity of market participation by the cotton farmers Table 2. Membership to various farmer associations would allow them to access pricing information and marketing outlets which will motivate them to participate more in cotton markets because they will be aware of the prevailing market conditions. This minimizes danger that could arise due to information asymmetry about these markets such as price fluctuations and reduced activity at any given time. According to Jari and Fraser (2009) farmers could benefit by association with group marketing strategies. Members of associations also enjoy the economies of scale because of their numbers when buying production inputs and during marketing of the seed cotton. Similar findings have been observed by Adam (2010) in a fruit market research. Experience of the farmer in cotton growing (*Cottn.exp*) and COTTCO market (*cottcomarket*) significantly influenced the market participation decision Table 2. The results showed that as the experience in cotton growing for the decision maker increases, chances for participating in markets were also increasing. Based on the key informant interviews we observed that the resilience of farmers to unfavourable experiences and relationships of farmers with various stakeholders in the cotton value chain were important factors influencing market behaviour. The key informants highlighted that many cotton buyers and contractors pulled out and the current giant buyer (COTTCO) have been facing challenges in paying farmers on time after deliveries. The COTTCO is mandated to distribute the presidential inputs to the cotton farmers and in return buys all the cotton from the assisted farmers. The main market for cotton in the study area was COTTCO which also controlled the source of inputs to the farmers through the presidential free input scheme. Hence the source of cotton input positively and significantly impacted on the chances of a cotton farmer to be involved in market participation Table 2. This indicated that availability of free inputs increased the possibility of the smallholder cotton farmers selling their cotton produce to suppliers of the inputs. Having access to inputs increased the chances of cotton market participation. However, from the key informants' discussions, the COTTCO has almost monopolised the buying of cotton in the studied areas but has been unreliable in some cases to the extent of paying cotton farmers in groceries suggesting that the organisation was cash-strapped. In order to reduce these negatives, the cotton market should be open so as to improve fairness in pricing and payment modalities.

3.2. Intensity of Cotton Market Participation

The results on cotton sales showed that the age (*Hsehldage*) of household decision makers was positively and significantly related to the quantity (kg) of cotton sold in markets Table 2. Meaning that, older aged households were likely to sell more kgs of cotton compared to younger household heads. The older household heads were most likely to be driven by the need to meet the household demands of food, school fees and medical bills from the sale of their cotton. Musara et al. (2018) also reported a similar finding in Zimbabwe's smallholder farming areas. They argued that, since older household heads have on average larger family sizes, the need for more cotton sales to get income increases. Labour force available in the household, as measured in adult equivalent units, had a positive impact on the quantity of cotton sold. Since the cotton production is labour intensive among the smallholder farmer, a large amount of labour is required, the households with more labour force have capabilities to grow cotton on larger areas. Our results agree with Scoones et al. (2011) who observed that labour was a major factor that influenced agricultural productivity during the land reform programme era in Zimbabwe.

Access to other sources of information (*Other info.*) has a significant influence on the intensity of market participation decision Table 2. From the focus group, the main sources of alternative information on cotton marketing were state media e.g newspapers, radios and TV, communications by bulk messages and WhatsApp platforms on cell phones and farmers group meetings. However, highly technical and expensive information sources were uncommon among the farmers since 75% of farmers from the focus groups had no smart phones and were not able to use the WhatsApp platform due to the costs associated and literacy problems. To overcome the technology and costs challenges, the cotton sales and associated price information is commonly relayed verbally at farmers' meetings and local radio stations. These results are similar to Alene et al. (2008) who noted the significance of communication platforms in maize market participation in Kenya.

4. CONCLUSION

The decision to participate in cotton marketing was exclusively influenced by experience in cotton growing while the intensity of cotton marketing was exclusively influenced by the household labour, access to other sources of information beside associations and the market prices. The age of household head, source of input and membership to marketing associations influenced both the decisions to participate and intensity of cotton marketing. Generally, the factors affecting the market participation decision are the same as those affecting the intensity of goat marketing decisions. However, the influence of COTTCO in cotton marketing has been dominating in the decision making. The study revealed the monopolistic influence of the COTTCO in the cotton marketing which should be a cause of concern to all cotton stakeholders in Zimbabwe.

From these results, it is recommended that the government should revisit the cotton marketing policies so as to encourage more players into cotton markets. Careful attention should be given refocusing on roles of the COTTCO in cotton marketing. In view of the current regulating marketing arrangement, the cotton industry should consider the marketing model applied in tobacco where the regulatory board does not buy tobacco but regulate to achieve fairness in the tobacco markets. Governance issues related to the cotton markets covering the structure, conduct and performance of the various cotton markets used by the smallholder farmers should be emphasized.

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