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CASE STUDY

An Analysis of the Factors Influencing the Smallholder Communal Cotton Farmers' Decision to Adopt Contract Farming. A Case of Zaka District

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ABSTRACT
The study analysed the main factors which influence the adoption of contract farming by smallholder cotton farmers in the Zaka district. The main tool which was used to collect the data was a structured questionnaire and the variables which were of interest were gender, age, marital status, master farmer training, livelihood source and extension service. The binary logit model was used to analyse the data. The major finding of the research was that livelihood source, extension services visitation frequency and experience of the farmers were crucial in determining the factors that influence the farmers' decision to adopt contract farming.
Keywords: *Gossypium hirsutum , Farmers*

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BACKGROUND

Gossypium hirsutum (Cotton) is grown primarily as a fibre crop, but the seed after ginning (lint removal) is also a major source of edible vegetable oil, ranking second to soya-beans in world oil seed markets, [1]. Cotton is well adapted to warm to hot, arid environments where it produces high yields as long as adequate water is available. Small holder farmers are concentrating on increasing production with hactrage of cotton increased from 338 270ha to 379 689ha in 2009-2010 and 2010-2011 seasons [2].

The full marketing process of agricultural products involves identifying customer needs, developing products and services to meet these needs, establishing promotional programmes and pricing policies and designing a system for distributing products and services to customers, [3]. Of the many market linkages, contract farming has been recognised as a system that has the potential to increase productivity and reduce rural poverty. Contract farming can potentially provide farmers with many benefits that extend far beyond the provision of inputs which include access to credit and loans, provision of extension and technical advice appropriate knowledge and management systems. These benefits are actually relevant to Zimbabwe's small holder farmers who until recently (when dollarization came into effect)were experiencing continuous economic hardship due to inflation also input supply is still on a critical condition since shortages are noticed, [4].

DESCRIPTION OF THE STUDY AREA

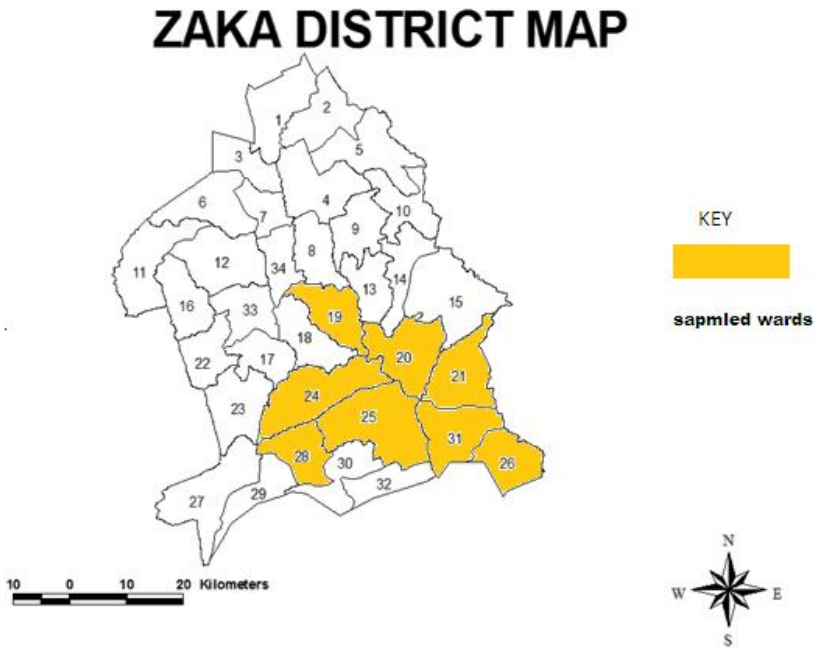
Zaka district is found in the southern part of Zimbabwe in Masvingo province, about 130 Kilometers from the city of Masvingo and 70Km from Chiredzi town. It is characterized by annual average temperatures of about 26 degrees Celsius and an average annual rainfall of about 500 mm as it lies in region v (Agritex Annual Report, 2009). The district is mostly characterized by sandy loamy soils and Black clay loamy soils in other parts of the area hence cotton production is viable. Besides cotton production in Zaka farmers are also into production of other field crops such as maize, sorghum, bambara nuts and ground nuts. Farming in the area is done mostly on dry land with irrigation practiced in few areas mainly for home consumption. Farmers in Zaka practice mostly extensive beef production especially the eastern part however, other farmers are into small livestock.

Cotton production is done commercially on the south eastern part of the district popularly known as Gwachara. The district has one cotton deport (Cottco) at Jerera growth point. The study was done in Zaka district because cotton is the major commercial crop grown in adddition it was expected that information on the factors influencing farmers' decision to adopt contract farming would be extracted from most farmers.

Sampling Procedure.

The cotton farmers in Zaka district were the target population of which they were sampled for data collection. The wards that are mostly in cotton production are given on the map below:

Fig 1 Zaka District Map



Source: Ocha Zimbabwe

In a total of 8 wards were cotton is mostly produced the population of cotton producers amounted to 2800. The study sample from the population and was obtained using the formula below.

$$\text{Sample Size} = \frac{X^2NP(1-P)}{d^2(N-1) + X^2P(1-P)}$$

X^2 = Table value of Chi-Square at d.f (0.5 confidence level)

N = population size

P = population proportion (assumed to be .50)

d = degree of accuracy (expressed as a proportion- 0.05)

Therefore sample size

X^2 = 3.84, N = 2800, P = 0.50, d = 0.50

$$n = \frac{3.84^2 * 2800 * 0.50\,(1 - 0.50)}{0.05^2\,(2800 - 1) + 3.84^2 * 0.5\,(1 - 0.5)}$$

= 247

Two sets of respondents were of interest in the study, that is, farmers in contract farming and farmers under self funding to which they formed the stratus. In line with selecting the actual farmers on the ground stratified random sampling was used and it was facilitated by the use of lists of cotton farmers obtained from the Agritex personnel. Separate random samples were taken from each stratum of which if put together they form the population. Names of farmers were selected randomly from the lists using random number tables. To avoid bias for the farmers two thirds was selected from the contracted farmers and one third from the non contracted farmers.

Data Collection and Tools

Qualitative (socio demographic factors such as gender, age marital status) and quantitative data (yield, prices of cotton and prices of inputs) was collected. Primary data was collected using a structured questionnaire and it broad areas which included the yield and sales of the sampled

farmers in the 2009/2010 and 2010/2012 seasons, the cost of inputs used during cotton production that is seed, pesticides (fenkill and cabaryl), the fertilizers transport and that of packaging which all form the marketing bills for the farmers. The questionnaire included other socio-demographic factors that are associated with the cotton farmers that is, marital status, level of education, master famer training, sex of the house hold head resource endowments, land sizes and the access to extension services. Questionnaires and interviews were preferred as they allow active participation of the farmers in providing information.

Secondary data collection techniques were also used as part of the research. Cottco Jerera and Zaka district Agritex were secondary sources of data since they were the main players in cotton production in the district. Data collected included the production trends, input usage, sales and the cotton prices in the seasons 2009/2010 and 2010/2011.

Data Analytical Tools

The Binary Logistic regression model was used to identify the socio-demographic factors that affected the farmers' decision to adopt contract farming. Considering the study, the explained variable (adoption) is a dichotomy as it can take only two values that is either the farmer adopts or does not adopt. In this respect the outcomes were given values as Y=1 for adopting contract farming and Y=0 for not adopting contract farming, thus giving rise to a binary dependent variable. A non linear model was used since binary dependent variables cannot be used freely in linear regression models.

The model was used to find the conditional expectation of the dependant variable for more than one explanatory variable. This means, the probability of a farmer adopting contracting farming was hypothesized to be a function of farmer. The mathematical derivation of the model is formulated as below:

$$\mathbf{Z_i = Log\ (P_i/1\text{-}P_i) = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7 + \varepsilon} \quad [5]$$

Where:

X1= gender of the household head (this indicates the sex of the household head sex that is either male or female)

X2= age of the household farmer (this implies the age of the household head by birth)

X3= marital status (marital status involves the status of the house hold head. A farmer can be single, divorced/separated or married)

X4= master farmer training (master farmer implies whether any member of the family has been involved in master farmer training or none of them)

X5= livelihood source (livelihood source was given the factor that supports the family to sustainably have a living)

X6= Extension services frequency (this indicates the frequency to which the farmer received extension service in a month that is none, once, twice thrice or more)

X7= experience (this entails the time to which the farmer has been growing cotton that is less than 10years or over 10years)

.ε= error term

RESULTS

Yield

The yield of the two farming system in the two seasons were obtained and averaged as presented in the table below. Total yield for the sampled farmers was obtained for both the contracted and self funded farmers to which the means for the two groups were derived as average for the groups.

Table 1: 2009-2010/2010-2011 Seasons Yield Summaries

Season	Farming System	%	Total (kg)	Mean (kg)
2009 – 2010	*Contract Farming*	64	35667	1101.531
	Self Funding	36	20130	1118.333
2010 – 2011	*Contract Farming*	64	22895	689.0313
	Self Funding	36	10540	585.5556

Source: survey data 2012

The table recorded a higher level of 35 667kg as the self funded obtained 20 130kg to which the difference was just nominal since the number of farmers sampled for each farming system was

different. The difference was notable in 2010/2011 season as contract farmers attained 22 895kg whilst self funded farmers have 10 540kg. The means for the two groups of farmers were in the same range for both seasons with little difference noted. Revenues of all the farmers were collected with the total variable costs which are presented in the following table.

Logit Model Results

The logistic probability model results were obtained from the SPSS. Important features for each variable were given that is the Beta value the t significance, the constant and the R square value.

Table 2: Logit Results

Variable	Variable description	β	Significance
Gender	Gender of the house head 1- male, 2-female	0.024	0.667
Age	Age of the household head 1-30to40, 2-40to 50, 3-51 and above	0.036	0.815
Marital Status	Marital status of the farmer 1-married, 2-divorced/separated, 3-single	0.244	0.943
MFT	Master farmer training attainment by any member of the house hold 1-yes, 2-no	0.024	0.531
LS	Livelihood source for the family in their every day life. 1-agriculture, 2-salary/wage, 3-business	-0.368	0.1[a]
Extension Services	The average times to which the farmer receives extension services 1-not at all, 2-once, 3-twice, 4-thrice.	-0.483	0.073[aa]
Experience	Experience in cotton farming 1<10 years >greater than 10 years.	0.033	0.001[a]
Constant		1.323	0.649
R Square	**0.5**		

[a]Represents significance under 0.05 and [aa] under 0.1 levels of significance.

Source: survey data 2012

The Logit model results shows that livelihood source, extension services visitation frequency and experience of the farmer were crucial in determining the factors that influence the farmer's decision to adopt contract farming since they reflected significance at 0.05 and 0.1 significance levels. This implies that livelihood source plays a role in the farmers decision to adopt contract farming with the farmers earning their livelihood from agriculture have the greater chance of adopting contract farming, also farmers that has high frequency in terms of receiving extension services has a greater chance to adopt contract farming. Variables such as MFT, Marital status, age of the household head and gender were not significant at 5% and 10% levels of significance. This implies that these variables were not essential in the determining the factors underlying adoption process of contract farming by cotton farmers in Zaka district.

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