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Effect of Social-Economic factors on the Decisions of Small Holder Wheat Farmers to Participate Market in Rwanda

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Abstract: ***Wheat is an important cash crop in the Rwandan market. The wheat market in Rwanda is made of small and medium holder farmers who are not participating in the market adequately though the attention given by Government to increase the production of wheat. The objective of this study was to examine effect of social economic factors influencing market participation decisions in Nyamagabe District Rwanda. A multi-stage sampling technique was used to select 149 respondents using well-structured questionnaire. Descriptive statistics was used to characterize wheat farmers and compare means of respondents. Probit model was employed to investigate factors influencing market participation decisions among small holder farmers in STATA version 13. The key findings from the probit model revealed that social-economic factors that influenced the decision to participate in wheat market were marital status, education, total land owned (ares), total area under wheat production (ares), total land allocated for other crops (ares), bicycle and mobile phones ownership. The study recommended that in order to increase market participation of wheat farmers there is need to improve on the social economic status of respondents through promoting adult education and focus on the current farmers' strengths and assets.***
Keywords: Market Participations, Probit Model, Small holder farmers, Nyamagabe District, Rwanda

I. BACKGROUND AND RATIONALE OF THE STUDY

In the Rwandan market, wheat is considered as cash crop. It is delivered to production plants to be milled and is also consumed by the household. According to FAOSTAT (2017) the area under wheat cultivation has increased from 24,157ha in 2005 to 44,284ha in 2011 with an increase in average yield from 0.908 t/ha to 2.1t/ha in 2013 but this has not reached a national target of 4T/ha by 2017. According to RAB (2013) the though the GoR has put efforts to increase wheat production but the sector still faces difficulties, particularly due to lack of organized wheat market chain, decreased demand from buyers causing excess production. Currently, the commercialization of wheat in Rwanda is made by two circuits:

The first circuit of national production which involves marketing of local wheat through circuit artisanal grinding mills at household level and circuit industrial transformation.

The producer is the first link of the chain of marketing. Sale starts with the decision to sale. The first sale is made at the time of the crop in the field. If the producer belongs to a cooperative, he/she can decide to sell through this structure. However a lot of sales are made without the intermediary cooperative structures. In the case of the sale intended for the artisanal transformation circuit, the producer sells in general to a collector in the small upcountry markets.

He can also bring his produce directly to the wholesaler in the big city. On the other hand, in the arrangement where the sale is intended for the industrial processing circuit, the producer belongs in general to a group or a cooperative which makes commitments (contracts) with a flour mill.

The producer brings his produce to the cooperative which contacted the flour mill, thenthe cooperativeroutes the produce at the processing unit. But the part of wheat commercialized through producers' associations remains weak because they often have no good coordination and collection system due to insufficient medium financiers to buy the produce. Moreover, they often lack competences in negotiations with the purchaser as well as other competences and management. Thus, there is a need to focus on the marketing constraints faced by wheat producers in Nyamagabe district so that wheat farmers can benefit from their produce (Niyibituronsa et al., 2014).

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II. METHODOLOGY

Nyamagabe District is one of the 8 Districts comprising the Southern Province. The reason for the selection of this study area is that compared to other Districts in the Province wheat farming dominates in Nyamagabe District and is grown in nine sectors (Mpirwa et al., 2018).

In this study, both quantitative and qualitative data were employed. The quantitative strategy used structured household survey questionnaire from a representative sample of households selected from wheat cooperatives. The cross section survey research design was used.

This study targeted the wheat producers involved in wheat marketing in Nyamagabe District. The total target population was 2052 registered cooperative members and out of these, 149 were selected.

According to Bowling (2014), a sampling frame is the set of source materials from which the sample is selected. It is a list of all those within a population who can be sampled, and may include individuals, households or institution. The early stages of selection in household surveys are typically drawn from area frames while the last stage may be selected either from an area or list frame.

Slovin's Formula adapted by Ryan (2013)was used to calculate the sample size (n) given the population size (N) and a margin of error (e). It was a random sampling technique formula to estimate sampling size.

It was computed as follows: $n = N / (1+Ne^2)$, whereas: n=number of samples, N = total population, e = error margin / margin of error (10%) at e=0.1.

Therefore the sample size was calculated as follows:

$$n = \frac{2052}{1+2052(0.1)^2} = 149 \text{ wheat Producers}$$

Table 1: Sample frame of cooperative members

No	Cooperative	Sector	Male	Female	Members	Samples
1	TUJYEMUMUCYO	BURUHUKIRO	22	57	79	6
2	KOTBU	BURUHUKIRO	17	33	50	4
3	KOABOBA	GASAKA	27	27	54	4
4	URUMURI	KIBILIZI	71	53	124	9
5	COOPROSENYA	KITABI	42	61	103	7
6	KOABAM	TARE	67	36	103	7
7	KOJYATA	TARE	20	45	65	5
8	KOAGIMITA	TARE	24	23	47	4
9	ABOGEZASUKA	TARE	13	17	30	2
10	COOPIMU	UWINKINGI	349	273	622	45
11	KODBMB	MUSEBEYA	317	458	775	56
TOTAL			969	1083	2052	149

A multi-stage sampling procedure was employed in order to draw a sample from wheat producers. First, the district was selected purposively because of wheat production potential and the existing low market participation. Secondly, wheat producing sectors were identified. Out of 9 identified sectors, 7 sectors were selected due to dominant wheat producers and organized cooperatives based on the information from the District cooperative officer.

From 7 sectors selected with 19 cooperatives, 11cooperatives were selected based on the number of cooperatives operating in each sector and to the high number of members in each cooperative to come up with 11 cooperative which gathered 2052 members as target population.The table 3.1 was used to get a sample of 149 wheat producers.

In order to get the sample of farmers proportionate sampling was used to select respondents because cooperatives differs in number of producers that is to say cooperatives had differences in number of respondents. Finally simple random sampling was used to select respondents.

Pilot testing was done before the questionnaire was taken to the field, to ensure quality and adequate information for the study. The questionnaire that was used in this study was pre-tested among small holder farmers in the same study, i.e. piloting on 10 sample members was conducted to test for validity and reliability of the data prior to the actual study. This ensured validity and reliability.

Data was coded and processed using SPSS and analysis was done using STATA13. Descriptive statistics together with probit regression model to analyze the relevant data. These were useful in analyzing household characteristics as well as analyzing the relationship between variables. The analytical techniques used in the study include, descriptive statistics, correlation analysis and regression analysis.

Probit model was specified as yes or no called dummy variable regression models in which determinants of an event happening and not happening was identified. It identified whether wheat producing smallholder farmers participated in the market or not. In such circumstances, the probit model estimation was employed as follows:

$Y_{1i} = X_{1i}\beta_1 + u_{1i} u_{1i} \sim N(0,1)$ (i)

$$MMP = 1, if Y_{1i} > 0 \; or \; (participated)$$

$$MMP = 0, if Y_{1i} \leq ior \; (Notparticipated)$$

Where Y_{1i} is the latent dependent variable which is not observed, Participated or not Participated X_{1i} is vectors that are assumed to affect the probability of sampled wheat household wheat market participation.

β_1- is vectors of unknown parameter in participation equation

u_{1i}: Are residuals that are independently and normally distributed with zero mean and constant variance.

III. RESULTS AND DISCUSSION

The demographic features of the 149 sampled respondents. These features are found to be of great help in terms of clearly showing the diverse characteristics of the respondents and the impact this diversity on their livehood.

The statistical summary provided in table 2 shows that the proportion of male-headed households of wheat markets participants (82.55%) is much higher than that of female-headed households that participated in wheat market (17.45%).Women in SSA are disadvantaged in marketing because of unequal distribution of resources (Brumfield &Ozkan, 2016).

The results also presented in table 2 also indicated that 63.1% were married families this is an indicator for stability in regard to production in the study area.

Table 2 also shows that 46.3% of market participants had no formal education, 32.2% attained primary level, 16.8% attained secondary level and 2.7% attained tertiary level and 2% had attended education courses like vocational trainings. The results of the study indicates low levels of education in the study area .The results of the study justifies the reason behind low participation of respondents in wheat market for example failature to understand market dynamics (Olwande et al.,2015).

Table 2. Demographic Characteristics of respondents

Sex of the household head	Freq.	Percent
Female	26	17.45
Male	123	82.55
Total	149	100
Marital status		
Single	12	8.05
Married	94	63.09
Widowed	39	26.17
Divorced	4	2.68
Total	149	100
Education levels		
No formal education	69	46.3
Primary level	48	32.2
Secondary level	25	16.8
Tertiary level	4	2.7
Others education	3	2
Total	149	100

A. Socio-Economic Characteristics Of Respondents

Age of household is a major demographic factor, measured in years. From Table 3, the average age of the household head who participated in wheat market is 46.5 years and their control counter parts is 50.6 years.

The plausible explanation for this is that as the farmer gets older s/he may not be able to sell more of her/his produce as compared to younger farmers due to social networks fomented over a period of time.

The results from the field survey indicated that the average family size for participants was 5.3 members per household. For non-markets participants, the family the average mean of 5 members. The results indicate both respondents had equal number of dependents which could either influence participation in one way or another.

Land holding size is the most important factor determining agricultural production and market participation in wheat production for rural households. For markets participants, the results from the field survey indicated that the land holding size was 75ares (0.75ha) and the average mean of hired land was 1.8ares (0.018ha). The results of the study indicates the importance of larger farm sizes in production and marketing due to opportunities related to surplus production thus improving market participation.

Table 3: Socio-economic characteristics of respondents

	Participants					Non-Participants				
Variables	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Age	93	46.5	13.5	24	85	56	50.61	13.08	30	91
Household size	93	5.3	3.2	1	30	56	5.055	2.321	0	14
Total land owned (ares)	93	75.0	56.2	0	254	56	30.89	33.59	0	165
Total land hired (ares)	93	1.8	6.8	0	50	56	0.389	2.004	0	14
Total cultivated land (ares)	93	61.7	45.6	4.5	210	56	26.4	29.75	4	165
Area wheat production (ares)	93	31.2	39.8	0	345	56	7.85	5.811	0	25
Land allocated for crops (ares)	93	34.1	33.5	0	122	56	18.65	28.6	0	152

The results from the probit model revealed that only marital status, education, total land owned (ares), total area under wheat production (ares), total land allocated for other crops (ares), bicycle ownership and mobile phones ownership were statistically significant at 1%, 5% and 10%. Table 4 indicated that marital status influenced the decision to participate in market among small holder farmers in the study area at 10% level of significance. Unexpectedly there is negative relationship between marital status and wheat market participation; one unit increase in marital status, the probability to participate in any markets outlets either brokers, retailers, wholesalers or commission agents decreased by -4.749 percent of the total markets participants. This is an implication that married farmers, single farmers (most youths) and widowed farmers have the same probability to participate in wheat markets. Additionally, it is an implication that the society in the study areas is stable and stable households can influence households to concentrate more on production than unstable society and married farmers could access banks services than unmarried farmers because there more faithful than other members and our results tally with (Nouman, et al ,2013).

Table 4 pertained to Social-economic factors influencing the decision to participate in market among small holder farmers in Nyamagabe District and the findings indicated that education of farmers influenced the decision to participate in market among small holder farmers in the study area statistically significant at 5% level of significance. As priori expectation, there is a positive relationship between level of education attained by farmers and wheat market participation; means that one year increase to level of education for wheat producers, the probability of markets participants increased by 6.425 percent for the total markets channels participants. Household heads with higher level of education are more likely to participate in markets because with increased level of education utilization of market opportunities tend to be higher (Lubungu et al, 2012). In addition to this access to education an individual is empowered with the marketing skill, provides a greater opportunity and knowledge that will spur individual to participate in the market due to market information (Takele ,2010). The results from the probit model presented in table 4 indicated that total farm size, total area under wheat production and the total land allocated for other crops (ares) influenced the decision to participate in market among small holder farmers in the study area. Asexpected, there is a positive relationship between farm size and wheat market participation for small holder wheat producers in the study area; increase of one acre to total farm size, the probability of wheat markets participants increased by 0.225 percent of total members attended any markets outlets. This is an implication that land is one of the most important inputs for rural households whose primary means of livelihoods is farming without larger farm size one can increase production and thus sales surplus produce to the market (Okezie, et al. ,2012). This

suggests that the more farm land a farmer allocated to wheat farming, the higher the yields obtained, which presents similar findings as those reported by (Goni et al,. 2007).The findings are also supported by the results found by Ugwumba et al,. (2010) who proved that land is underutilized mainly due to land tenure problems associated with land fragmentation therefore based on the results it is implied that as the sizes of land holding continue to decline, it is increasingly going to become difficult to increase productivity through expansion in plot sizes. Table 4 pertained to social-economic factors influencing the decision to participate in market among small holder farmers in Nyamagabe District and the findings indicated that asset ownership such as bicycle, radio and mobile telephone ownership influenced the decision to participate in wheat market in the study area. This is an implication that ownership of transport equipment such as bicycles, motorcycles and truck have a positive impact on market participation by reducing the cost of transporting output from the farm to the market (Key et al,. 2000). Another plausible explanation for this is that bicycle ownership reduces the transaction costs accrued in agricultural commodities' supplied to markets channels for small holder farmers and our findings from the probit model conflict with the research of Lifeyo (2017) where they confirmed that ownership of a bicycle by agricultural households had no effect on either production or market participation decisions, but significantly reduced the amount of common beans purchased on the market by 38.2 percent. Expectedly, there is positive relationship between radio ownership and wheat market participation because one unit increase in radio ownership, the probability of farmers to attend wheat markets increased by 0.173% of markets participants. Agricultural households that owned a radio were more likely to produce wheat (0.173percent) than those who did not. Our findings are similar of those of Khanal (2013) who reported that farmers receive useful information through radio programs, which motivates them to alter farming methods and apply new technologies. This follows results reported by Mather and Jayne (2011) showing that radio programs that provide farmers with information on market prices increase both the probability of participation in the market and the extent of participation. Ownership of communication equipments such as mobiles, radios and televisions have a positive impact on the market participation by facilitating marketing information to the farmers. Mobile phones are useful in dissemination markets information and price information among markets participants. Mobile phones improve access to financial services, provision of agricultural information, improving data visibility for supply chain efficiency and enhancing access to markets. In addition, mobiles can help farmers improve agricultural productivity by giving them access to basic financial services, new agricultural techniques and new markets, in turn helping them to secure better prices for crops and a better return on investments these findings are in line with the findings of Tadesse and Bahiigwa (2015) and Furuholt and Matotay (2011) who confirmed that the greatest potential for improving farmers' income comes from access to financial payments and agricultural information via mobile, together delivering approximately 75% of the total increase in agricultural income. Thus the study rejects the null hypothesis stating that social-economic characteristics among small holder wheat producers have no influence on market participation and accept the alternate research hypothesis that social-economic characteristics of small holder wheat producers have influence on market participation.

Table 4: Effect of Social-economic factors on the decisions to participate in wheat markets

Market participant	Coef.	Std. Err.	Z	P>|z|
Social Economic factors				
Age	0.0028	0.0175	0.16	0.874
Sex	0.2978	0.4380	0.68	0.497
Marital Status	-0.4749	0.3362	-1.41	0.158*
Education	0.6425	0.2298	2.8	0.005**
Family size	-0.0774	0.0725	-1.07	0.286
Total land owned (ares)	0.0225	0.0112	2.01	0.044**
Total area under wheat production (ares)	0.0479	0.0332	1.44	0.148*
Total land allocated for other crops (ares)	-0.0716	0.0374	-1.92	0.055**
Bicycle ownership	0.0000	0.0000	2.95	0.003**
Radio ownership	0.0173	0.0098	1.71	0.088*
Mobile phones ownership	0.0000	0.0000	1.42	0.157*
Price	0.0006	0.0064	0.09	0.926
Revenues	0.0000	0.0000	0.77	0.439
Total cost	0.0000	0.0000	0.36	0.715
_cons	-1.2942	1.1216	-1.15	0.249
Probit regression, Number of Obs= 149; LR chi2(10)= 87.74;Prob > chi2 = 0.0000; Log likelihood = -47.948697; Pseudo R^2 = 0.4778				

Note: *** @ 1%; ** @ 5% and * @ 10% level of significant

IV. RECOMMENDATIONS

The study recommends that the government and other relevant stakeholders help in the improvement of farmers' social economic factors such as farmers' assets and their strength such as education, farm sizes and communication assets like radio and telephones through promoting adult education, decentralization of the communication assets at farmer level. Policies will also influence the level of output produced positively which was significant because the size of land to be tilled will increase which increases the chances of producing a marketable surplus.

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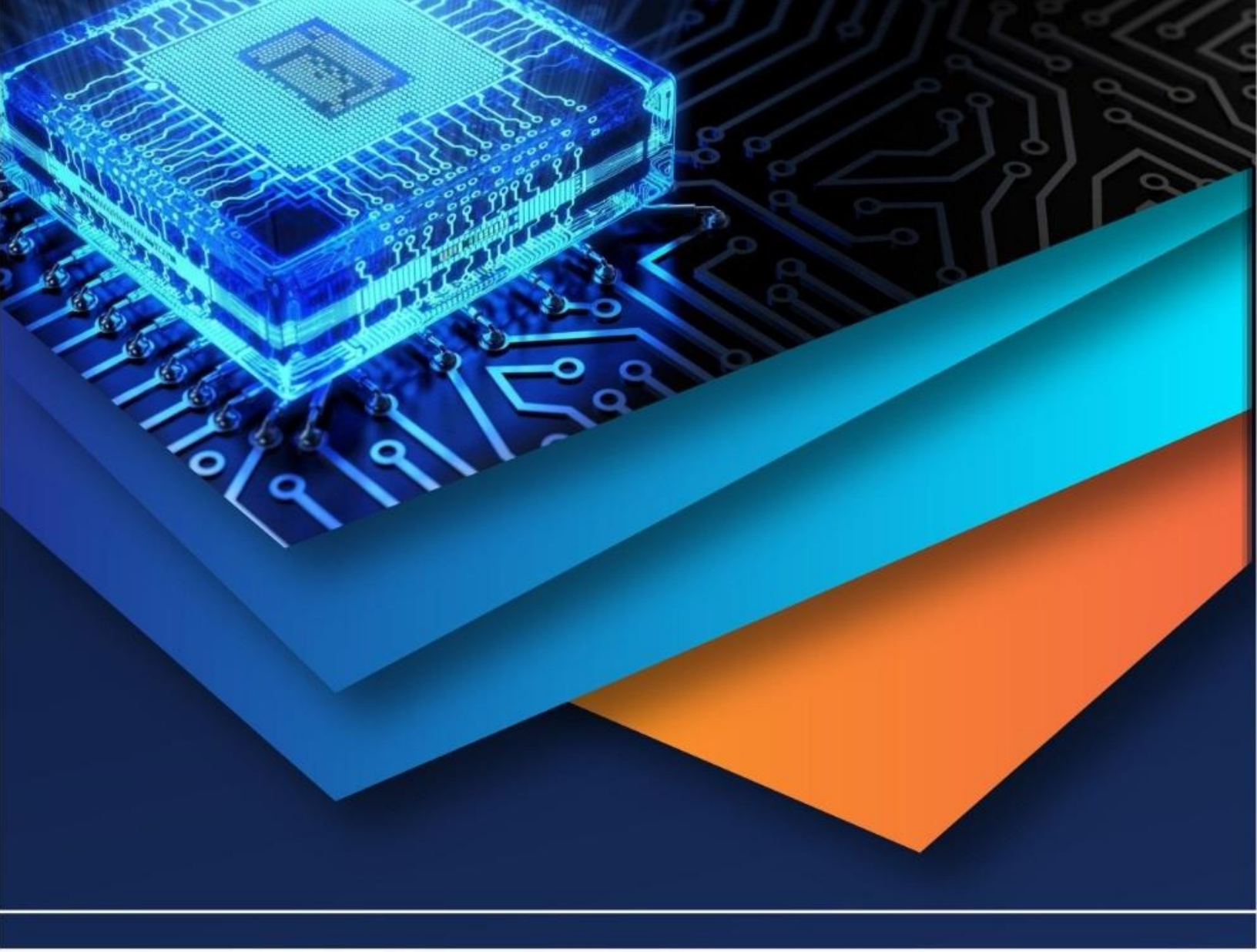

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