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SOCIO-ECONOMIC DETERMINANTS OF PARTICIPATION IN SUNFLOWER VALUE CHAIN AMONG SMALLHOLDER FARMERS IN IRAMBA DISTRICT TANZANIA

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ABSTRACT
Sunflower value chain represents one among the valuable vegetable oil subsectors worldwide. However, some constrains limit smallholder farmers to effectively participate in the value chain activities in order to generate household incomes and improve their livelihoods. Therefore, the study examined the socio-economic factors influencing smallholder farmers' participation in sunflower value chain whereby a cross sectional research design and mixed methods approach laid the framework for collection and analysis of data. Data was sourced from 368 smallholder farmers selected by using a systematic sampling technique. Focus group discussions and key informant interviews were used for qualitative data collection while household survey questionnaire for quantitative data. Constant comparison technique was used to analyse qualitative data and binary logistic regression for quantitative data. Findings indicate that socio-economic factors including age, education level and possession of agriculture tools significantly ($p < 0.05$) influenced participation in sunflower value chain. The study concluded that socio-economic factors collectively other than singlehandedly have a significant influence towards participation in value chain. Since some findings had indications that males dominate productive resources unevenly, it is recommended that gender sensitive approaches should be used to circumvent the biased practices in order to increase participation in sunflower value chain activities.

Keywords: *Participation, Sunflower, Value Chain, Smallholder Farmers.*
Paper type: *Research paper*
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1. INTRODUCTION

Agriculture is among the major source of livelihoods in Africa and plays an important role in rural poverty reduction, given that the majority in the rural areas are employed in agriculture (Chongela, 2015; Sarris, Savastano, & Christiaensen, 2006). In Sub-Saharan Africa, smallholder farming alone constitutes almost 80% of all farming

activities and directly employs about 175 million people (Alliance for a Green Revolution Africa (AGRA), 2014). The sector provides sources of livelihood for multitudes of smallholder farmers (Organisation for Economic Co-operation and Development (OECD), 2016) but also is an important engine to the growth of national economies through forward and backward integration and linkages with other sectors in the economy. The backward linkages through purchases of farm inputs and implements, fertilisers and chemicals form manufacturing sector, in return the forward linkages through provision of raw materials and supplies to the manufacturing industries (Lekunze, Antwi & Oladele, 2011).

Likewise, agriculture has a substantial contribution to the Gross Domestic Product (Chongela, 2015) in Tanzania and remains a main source of economic livelihoods to the population for about 66% particularly in rural areas (Kinyondo & Magashi, 2017). For example in the rural areas, the sector is dominated by almost 3.7 million smallholder farmers, and in 2017 the sector employed about 65% of the population (Deloitte, 2017). Therefore, to the households of the smallholder farmers, agriculture is the main income source and supports nearly all of the household necessities since the households consume the crops they grow and sell their crops or livestock products for income (Rapsomanikis, 2015; New Partnership for Africa's Development (NEPAD), 2013).

The sunflower subsector in agriculture is highly dominated by smallholder farmers and represents one among the valuable vegetable oil subsectors worldwide whereby 39.62 million metric tons were produced in 2015 (FAOSTAT, 2015). According to Food and Agriculture Organisation (FAO) (2010), the world bumper production of sunflower depends largely on the increased demand for oilseed in the world market as well as the favorability of weather conditions in major producing countries. Worldwide, Tanzania is ranked number ten among the largest producer of sunflower seed while ranked second in Africa (FAOSTAT, 2015). Sunflower is produced in 15 regions out of 25 regions and among them, Singida makes up 40% of the total production followed by Iringa (13.83%), Dodoma (12.35%), Manyara (11.91%) and Rukwa (11.18%) (URT, 2012). The crop has increasingly become important for the majority of the smallholder farmers' households in the central corridor regions who depend on farming as one among the major sources of household livelihoods (Salisali, 2012). In Singida Region sunflower production ranks first among the crop production for income generating activities where the majority of households (53%) depend on sunflower production as a main source of livelihood (URT, 2012). Hence, the crop is one among the important sources of livelihood and the initiatives undertaken to promote its production have attracted the attention of various stakeholders (Ministry of Agriculture, Food and Co-operatives (MAFC), 2008).

As a result, government and development agencies have made a number of initiatives to support efforts for organising sunflower actors using the value chain approaches aiming at improving livelihood outcomes (Tanzania Edible Oils Actors Association (TEOSA), 2012). The interventions, among others, include the introduction of Quality Declared Seeds (QDS) by Rural Livelihood Development Program (RLDP) and that of SNV (Netherland Development Organisation) that focused on developing cluster areas for sunflower processors so as to increase their economies of concentration and markets for their products. These initiatives have enabled sunflower smallholder farmers to engage in contract farming (Henningsen, Mpeta, Adem, Kuzilwa & Czekaj, 2015), increase sunflower production and access to finance (Salisali, 2012). Similarly, the interventions provide an unwavering alternative source of income to smallholder farmers particularly when the focus is on production, processing, and other nodes in the value chain (Nerman, 2015; URT, 2015).

Regardless of the observed initiatives and potentials of sunflower, mostly the smallholder farmers end up with uneven benefits compared to their efforts and investments as the markets are normally not stabilised to their benefits (Salisali, 2012). Collusive price setting (Lubungu, Burke, and Sitko, 2014) and relentless price variations determined by rural collectors (Beerlandt, Uronu & Phlix, 2013; United Nations Conference on Trade and Development (UNCTAD), 2015) unlike the prevailing market prices (Kawamala, 2012) discourage continued efforts of smallholder farmers' participation in sunflower value chain. Also, the production of sunflower is a demanding business and complex with numerous pressures in terms of socio-economic factors (source of labour, land acquisition and preparation etc) and financial factors (access to credit to finance production), unpredictable weather conditions, market infrastructure, processing facilities and trading facilities.

The aforementioned production related factors sometimes contribute as barriers towards effective market participation by smallholder farmers (Mazibuko, Balarane, Antwi & Yeki, 2018) which in turn influence them to consider short term off-farm sources of household income which are not sustainable. Thus, despite the increasing demand for sunflower and production potentials, a multitude of challenges and risks at times pose obstacles towards successful participation of households in sunflower value chain activities particularly in the nodes relating to cultivation, storage and processing before marketing. Therefore, the study aimed to assess the socio-economic determinants influencing participation of smallholder farmers in sunflower value chain activities. Towards operationalising the study objective, it was hypothesised that "socio-economic factors do not influence smallholder farmers' decision to participate in sunflower value chain activities"

The study undertakings were guided by the theory of participative behaviour (theory of margin) developed by McClusky (1963). The theory basically underlies the assumptions for understanding adults' lives when participating in different socio-economic activities, especially as they become older whereby various demands or pressures increase. The assumptions base on margin, load and power (McClusky, 1970) which influence individual motives to participate in different household socio-economic activities. The theory provided guidance towards conceptualising the underlying motives influencing heads of households (smallholder farmers) to participate in sunflower production so as to cope with the load of household requirements for sustenance and improving the overall household well-being.

2. METHODOLOGY

The study was guided by a cross sectional design since data for multiple variables were collected from a representative sample with varied characteristics as recommended by Labaree (2009) and Rindfleisch, Malter, Ganesan, & Moorman (2008). The design also allows data to be examined at a single point in time in order to detect association and patterns of variables (Bryman, 2012). A mixed methods approach was used since the utilisation of quantitative and qualitative techniques was possible in the collection and analysis of data in order to corroborate findings (Saunders, Lewis & Thornhill, 2012). The assumptions of the mixed methods approach base on the combination of quantitative and qualitative approaches towards providing a complete understanding of a research problem (Creswell, 2014).

Data were collected from both participant and non-participant smallholder farmers in sunflower production for the purposes of comparison and determining the influencing factors. Participation was measured at the production and marketing nodes in the value chain where smallholder farmers participate mostly. A sample size of 384 respondents estimated by using Daniel's (2009) formula was used since it accommodates the participants (p) and non-participant (1-p) towards sample size calculation.

$$\text{Sample Size (n)} = \frac{z^2 \text{x (p) x (q)}}{d^2} \quad \text{..... (1)}$$

$$n = \frac{(1.96)^2 \times [0.5(1-0.5)]}{(0.05)^2}$$

n = 384

However, only 368 respondents including participants (sunflower smallholder farmers = 213) and non-participants (non-sunflower smallholder farmers = 155) were interviewed due to unavoidable circumstances (convenience of availability and willingness to participate). Thus, the response rate was equivalent to 95.8% which was reasonable as remarked by Babbie (2010) that a response rate of 70% and above is very good. Systematic sampling technique was utilised to obtain respondents whereby the lists for selection was obtained from the households' register from the Village Executive Officer (VEO). However, Village Agricultural Extension Officers (VAEO) were also consulted during sampling of households from the village households register. The sampling interval (kth element) was determined using the Kth formula, and thereafter the first observation (L) was randomly chosen by writing the serial numbers on separate pieces of paper which were folded, and the first one randomly picked.

The collection of quantitative data involved the use of a household survey approach with a structured questionnaire that was pre-tested and revised accordingly prior to data collection. Qualitative data were gathered by using Key Informant Interviews (KIIs) and Focus Group Discussion (FGDs). A total of 3 KIIs were conducted with purposively selected technical and administrative personnel based on their knowledge on production of sunflower and community development. Additionally, 5 FGDs were scheduled and conducted with smallholder farmers whereby the groups on average constituted 6 to 8 randomly selected members as recommended by Bryman (2012). Participants' variations included women and men smallholder farmers (as heads of household/representative) of different age patterns to capture the varied perceptions and perspectives. Qualitative data were transcribed, categorised, coded (open coding and axial coding) and thereafter grouped into themes pertaining to the objective and analysed using constant comparison technique. Descriptive statistics (mean, median and mode) were used for analysis of the socio-economic characteristics while binary logistic regression to analyse factors influencing participation in the sunflower value chain. The model choice was guided by the nature of the dependent variable (participation) which was dichotomous.

$$\text{Logit}(P_i) = \log\left[\frac{p(x)}{1-p(x)}\right] = \alpha + \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \ldots\beta_pX_p + \mu \ldots\ldots(2)$$

Logit (Pi) = Y represents the probability of participation or otherwise
α = intercept of the equation
β_1 to β_p = predictor variables regression coefficients
X_1 to X_p = predictor variables
μ = error term

Table 1: Definition of Model Variables

Variable	Definitions and units of measurement
Dependent variable	
Participation	Binary: 1 = participation 0 = otherwise
Independent Variables	
AGE (X_1)	Age (years)
SEX (X_2)	Sex of household head (1=male, 0=female)
MMS (X_3)	Marital status (1=single, 2= married, 3= divorced, 4= widow 5=separated)
EDU (X_4)	Education (years of school)
HHS (X_5)	Household size (number of members)
HSO (X_6)	Modern house ownership (1=own, 0=otherwise)
AGT (X_7)	Agriculture Tools (number of items owned)
HHA (X_8)	Household Assets (number of household assets owned)

3. FINDINGS AND DISCUSSIONS

3.1 Socio-economic Characteristics

The characteristics were categorised in terms of household size, age, education level, marital status and sex. Among the respondents the minimum age was 24 years for participants and 22 years for non-participants while the maximum age was 77 and 58 respectively for participant and non-participants. The median age was 31 and 46 years correspondingly which implies that most of the household heads were still active to participate in production activities including agriculture where the majorities were involved with. Thus, heads of household in the study area were among the most active labour power in production activities which were very important for generating household income and sustenance of livelihood outcomes (Mchopa & Jeckoniah, 2018a). Also, findings in Table 2 indicate that the median household size was 3 persons for participant households while the minimum and maximum were 1 and 7 persons respectively. Among non-participant households, the median was 2 persons while the minimum and maximum were 1 and 5 persons respectively.

Large household size matters when it comes to sources of labour for livelihood activities (human asset/capital) as observed by Machimu (2016) and Kayunze (2000) who argued that household size has an implication on family

labour supply since they work together in most of the household economic activities aiming at generating household income. This was also illustrated during FGD whereby members agreed that the household size matters when it comes to production activities (particularly agricultural based) since the members of the household serve as man-power (source of labour). Thus, households with more members of active labour age have more chances of sustenance since they can be more productive, unlike those with fewer members of active labour age (Mchopa & Jeckoniah, 2018b).

Table 2: Household size and household head age statistics (n = 368)

Variable	Respondents	Minimum	Median	Maximum
Age	Pooled	22	41.5	77
	Participant	24	46	77
	Non-participant	22	31	58
Household Size	Pooled	1	3	7
	Participant	1	3	7
	Non-participant	1	2	5

The study profiled the households in terms of their level of education since it improves the chances of understanding and articulation; therefore, as the head of household becomes more literate the household has better opportunities for formal and informal livelihood opportunities. Table 3 findings indicate that the majority of household heads (59.2%) had primary education followed by 28.0% with ordinary secondary education. This shows that respondents were literate which influenced them to participate in different production and other socio-economic activities in order to improve their household livelihoods. Thus, due to their awareness on better production techniques, it increased their commitment to improved production techniques which according to Brown Stephens, Oumac, Murithid, & Barrette (2006) have an influence towards guaranteeing higher yields and substantial household incomes as well as livelihoods.

Table 3: Education Level among Respondents

Education Levels	Pooled (N= 368)		Participant (n =213)		Non –Participant (n=155)	
	F	%	F	%	F	%
No formal Education	3	0.8	3	1.4	00	00
Primary Education	218	59.2	152	71.4	66	42.6
Secondary (O level)	103	28.0	47	22.1	56	36.1
Secondary (A level)	11	3.0	1	0.5	10	6.5
Vocational Education	4	1.1	1	0.5	3	1.9
College Certificate	15	4.1	1	0.5	14	9.0
College Diploma	13	3.5	7	3.3	6	3.9
Bachelor Degree	1	0.3	1	0.5	00	00

Findings also indicate that most of respondents were male (83.2%) compared to female (16.8%) which is not surprising in the rural set up involved with agricultural production due to cultural settings whereby households headed by males were more favoured resource wise and thus, had higher participating chances in agricultural production activities. Talking on the aspect of male dominance, a key informant who was a ward agricultural extension officer pointed out that "*...due to cultural norms and beliefs most of the agricultural productive resources such as land, tools and oxen are dominated by male...even in some female-headed households you will find the male in-laws poaching productive resources what is left to the widows...*" This was also observed by Ayoola *et al.,* (2012) who reported gender inequalities towards farmers' access to productive resources including appropriate technology, land, extension services and agricultural inputs.

With respect to marital status, most of the respondents were married as presented in Table 4 whereby they account for 69.3% however when categorised statistics show that more sunflower smallholder farmers (82.6%) were

married compared to their counterparts who account for 51%. Also, a few sunflower smallholder farmers (4.2%) were not married (single) compared to their counterparts whereby 41.3% were single which is higher than the participants. This gives an implication that majorities of smallholders were married and thus, had a higher propensity of becoming farmers rather than the un-married individuals since they want to be close to their respective families through being engaged in agricultural activities (Rayasawath, 2018) and find successors rather than being engaged into other farfetched socio-economic activities. Respondents who were single (41.3%) seemed to have lower chances of joining agricultural production activities compared to their counterparts probably because they are less occupied with family responsibilities and are capable of looking for alternative opportunities or different life experiences (Lobley, Baker & Whitehead, 2010).

Table 4: Sex and Marital Status of Respondents (n = 368)

Variable	Attributes	Pooled (%)	Participant (%)	Non –Participant (%)
Sex	Male	83.2	81.2	85.8
	Female	16.8	18.8	14.2
Marital Status	Single	19.8	04.2	41.3
	Married	69.3	82.6	51.0
	Divorced	01.9	01.9	01.9
	Widow	07.6	08.9	05.8
	Separated	01.4	02.3	00

3.2 Socio-economic Factors Influencing Participation in Sunflower Value Chain

A binary logistic was estimated to find out how socio-economic variables influencing the participation probability (treated/participation =1 or untreated/non-participation = 0) in the overall sample. Results in Table 5 indicate the Omnibus test of model coefficients was statistically significant at $p = 0.00$ and yielded a Chi-square of 286.18. This implies that there is adequate fit of the data to the model and among the covariates at least one is significantly related to the response variable (Mangasini, 2015). Also, the model had a Cox & Snell R Square of 0.541 as well as Nagelkerke R Square (R^2) was 0.727 meaning that the predictor variables entered in the model captured 72.7% of the variance in the factors influencing respondents to participate in sunflower production. The rest of the variation was due to unaccounted variables in the model and/or model inherent errors. Among the predictor variables, age of respondent, education level, modern house ownership, possession of agriculture tools and household assets ownership were significant ($p \leq 0.05$) while sex of respondent, marital status and household size were not significant towards influencing participation ($p \geq 0.05$).

Age of respondents was among a significant predictor of participation at $p = 0.050$, a Wald statistic of 0.022 and an Exp (B) of 1.015. Findings imply age of respondents significantly influences smallholder to participate in sunflower production. With a maximum and minimum age of 77 and 22 years respectively and average of 46 years it implies that as respondents get older they are more influenced to participate into sunflower production in order to get more household incomes to cover for household expenditures. Sunflower has been reported to be the most dominant cash crop in the district with a high contribution to household incomes and livelihoods. Therefore, due to its potentials, it has attracted the majority of households to participate in sunflower value chain activities in order to improve and sustain their livelihoods in terms of household income, household assets and food security as observed by Mchopa & Jeckoniah (2018a).

The education level of the respondent was also a significant predictor of participation at $p = 0.000$, a wald statistic of 16.795 and an Exp (B) of 0.700. It implies that level of education statistically had a significant influence on participation in sunflower value chain activities particularly production and marketing. Almost 59.2% of respondents had primary education while 28.0% had ordinary secondary education which shows that most of the respondents were literate which influenced their participation because the smallholder farmer can apprehend and process information more rapidly unlike the less educated. This is due to their awareness of better production techniques to guarantee higher yields and substantial household incomes as well as improved livelihoods as observed by Brown *et al*. (2006). Likewise, Bruce, Donkoh & Ayamga (2014) found that formal education enables smallholder farmers to grasp the information provided which in turn stimulates adoption of agricultural

technologies. Similarly, formal education provides smallholder farmers with the ability to interpret, perceive and respond to new information and technologies much faster as observed by Bekele & Meckonnen (2010) as well as Uaiene, Arndt & Master (2009).

Possession of agriculture tools was one among the predictors influencing participation into sunflower production significant at p = 0.000 as shown in Table 5. Findings entail that having agriculture tool such as hoes, ox cart, power tiller, chemical sprayers has a significant influence towards participation as the smallholder farmers already have tools of production which drive them to participate compared to those starting afresh which might come handy acquire the tools. Furthermore, possession of household assets influences smallholder farmers to participate in sunflower which is significant at p = 0.000. Findings imply that the quest to acquire more household assets highly drove smallholder farmers to participate in sunflower value chain activities since it's the most income generating cash crop, unlike other crops due to the increased demand and consumption of edible oils (Beerlandt, Uronu & Phlix, 2013). Thus, more smallholder farmers were influenced to cultivate sunflower in order to improve their living conditions, increase household assets, and hedge livelihood shock as observed by Mchopa & Jeckoniah (2018b).

Table 5: Results on factors influencing participation in Sunflower Value Chain

Variables	β	S.E.	Wald	Df	Sig.	Exp (β)
Sex of respondents	-0.784	0.497	2.488	1	0.115	0.456
Age of respondents	0.015	0.022	0.442	1	0.050*	1.015
Marital Status	-0.203	0.214	0.896	1	0.344	0.816
Education Level	-0.357	0.087	16.795	1	0.000*	0.700
Household Size	0.032	0.182	0.031	1	0.861	1.032
House Ownership	1.177	0.592	3.962	1	0.047*	3.246
Agriculture Tools	1.456	0.278	27.358	1	0.000*	4.288
Household Assets	1.453	0.212	47.156	1	0.000*	4.278
Constant	8.608	1.831	22.095	1	0.000	0.000

**significant; Omnibus tests of model coefficients (Chi-square = 286.18; sig. = 0.00); Cox & Snell R Square = 0.541; Nagelkerke R Square= 0.727*

Owning a modern house (well-built and iron sheet roofed) was one among the significant predictors of participation in sunflower production with p = 0.047, a wald statistic of 3.962 and an Exp (B) of 3.246 as shown in Table 5. Results entail that the desire to own a modern house has a significant influence on participation since smallholder farmers were motivated to participate into sunflower value chain activities in order earn better household incomes and improve the conditions of their houses. During an interview, a key informant pointed out that "*…before the introduction of sunflower crop mostly the smallholder farmers depended on growing maize as a main food crop as well as cash crop...they were not able to produce substantially and could not get enough yield as well as incomes for improving their house conditions due to unfavourable weather conditions since the district is mostly semi-arid...*"

Thus, sunflower value chain unmasked new opportunities for smallholder farmers to improve their households' livelihood which was evidenced by the presence of well built and well roofed houses as well as small business ventures across the *Mwanza* Highway. The same was observed by Faty, Mwanga & Shimoda (2013) who noted the significant changes in household livelihoods such as the presence of well built houses and roofed with corrugated iron sheets unlike 5 years back where smallholder farmers used to live in weakly constructed and grass roofed houses.

Among the socioeconomic factors, sex of household heads was among the ones with insignificant influence (β = -0.784; Wald 2.488; p = 0.115) indicating that whether the household head was a male or female had no influence on participation in sunflower value chain activities at different nodes. The findings seem to imply that there were no disparities in the conditions for participation by considering the sex of the household heads however, on the contrary, due to cultural settings households headed by males were more favoured in resources and thus, had higher chances for participation. A key informant pointed out that *"... due to cultural norms and beliefs most of the*

agricultural productive resources such as land, tools and oxen are dominated by male...even in some female-headed households you will find the male in-laws poaching productive resources what is left to the widows..."

Similarly, Lekunze, Antwi & Oladele (2011) observed that most of the sunflower producers are male since they have more time to attend their farms than their counterparts who are mostly occupied with household operations and spend little time to attend their farm fields. Also, males have strong power in bargaining than a female when it comes to negotiations and acquisition of inputs which provides conducive conditions for participation. Thus, despite the findings pointing otherwise, practically the male-headed households are more favoured to participate in sunflower value chain activities unlike female-headed households.

4. CONCLUSION AND RECOMMENDATIONS

A number of socio-economic factors seemed to influence households of smallholder farmers to participate in sunflower value chain activities such as cultivation, harvesting, processing packaging and storage prior to marketing. Factors including age, education level, possession of agriculture tools and the quest to increase household assets were found to influence participation while on the contrary marital status, sex and household size were otherwise. Therefore, socio-economic factors collectively other than singlehandedly have significant influence on participation in the sunflower value chain activities since effective participation would require the factors of production (land, labour and capital).

Nonetheless, households were endowed differently with production resources and assets hence, their levels of participation would be different across the nodes of the value chain. Since findings had some indications of male dominance of productive resources the study recommends gender-sensitive approaches and techniques be used to outwit the discriminations and gender biased decision in order to improve the level of participation in different nodes of the sunflower value chain. This can be done by promoting dialogues in the community in order to modify and/or transform discriminative and biased norms in the ownership and utilisation of productive resources towards participation into value chain activities aiming at improving household livelihoods.

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