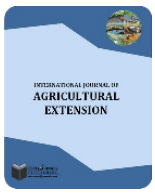

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WHICH SOCIO-ECONOMIC FACTORS MATTER IN FARMER GROUP PARTICIPATION? EVIDENCE FROM COFFEE PEST MANAGEMENT LEARNING GROUPS IN MT ELGON REGION, UGANDA

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A B S T R A C T

This study was conducted in Uganda to determine whether socio-economic factors influence farmer participation in mixed sex coffee Integrated Pest Management group processes mobilized by the USAID funded Integrated Pest Management Collaborative Research (IPM CRSP) Program in Uganda. The study used a cross sectional research design and a total 126 (71 men and 55 women) coffee IPM group members by census. A participation index was computed as a measure of level of participation in group processes. The ordered probit regression model was used to analyze determinants of level of participation in coffee IPM groups processes. Findings revealed that about 46% of the men compared to 25% women rated high on the group participation index with a significant chi-square difference ($p< 0.05$). Membership in economic groups, being a man, access to extension services, age, total number of household labor and participation in non-farm income generating activities significantly and positively influenced group participation. Factors that had a negative significant influence were experience of farmers in coffee production, and household size. The study concluded that research and development approaches that utilize groups should identify and address barriers to women's participation and benefits from mixed sex group processes. The approaches should use methods suited to younger farmers and those with limited experience in coffee production, no off-farm income options and those not in groups.

Keywords: Gender issues, Agriculture, Integrated Pest Management and Uganda.

INTRODUCTION

The use of farmer groups to promote participatory technology testing, learning and dissemination is widely practiced by agricultural researchers to enhance adoption of integrated pest management practices (Erbaugh *et al.,* 2010). The farmer field school (FFS) approach is one such classic example of the use of groups to promote Integrated Pest Management (IPM) (Danielsen *et al*, 2011). FFSs were intended to reach out to marginalized groups who might not have access to training, knowledge and inputs (Erbaugh *et al*., 2010). Central in these group processes is member participation. Participation may be defined as an act of taking part in an activity usually with others (Farid *et al.,* 2009). In other words, it refers to involvement of individuals and groups in development processes with an objective of ensuring self-reliance and improved standard of living (Mellouli, 2003; Nxumalo & Oladele, 2013). For this study participation refers to individual involvement and benefit from coffee IPM group activities.

Participation in group processes together with the attendant benefits is not uniform across different categories of members. The variation in participation is affected by a number of factors. For instance, in various contexts, gender has been found to influence participation in group processes. Women and youth are often excluded from participation, leadership and decision-making processes in various developing countries including Mozambique and South Asia (Tanwir & Safdar, 2013; Gotschi *et al*., 2009 & Agarwal, 2001). Participation for women is further influenced by age, educational level, time, status, and previous

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membership in organizations, access to assets and resources, organizations' rules of entry, socio-cultural norms and enabling environment (Kaaria *et al*.,2016). In fact, Gotschi *et al.* (2009) found that men control and manage most producer organizations, cooperatives, workers' unions and out grower schemes in Mozambique.

Besides gender, a range of other factors have been found to influence participation in collectives. Angba & Itari (2012) found a significant relationship between farm size, educational level, income and participation in social organizations in Nigeria. This meant that farmers with large farm size, high educational level and high income participated in social organizations more than those of lower socio-economic characteristics. According to Gyau *et al.* (2016), age, gender, education and perceptions on knowledge and improved technology influence the decision to participate in group activities by farmers in Kenya. Other studies identified education levels of the household head, participation in non-farm activities, age, gender, household size, distance to tarmac road, and/or farm size as some of the factors that would influence individuals to participate in farmer groups in Uganda, Tanzania, Romania and Kyrgyz Republic (Davis *et al.,* 2010; Benin *et al*., 2008; Sabates-Wheeler, 2006; Towo, 2004).

Participation in coffee IPM groups in Eastern Uganda may manifest a unique pattern of determinants given the dynamic and contextual nature of social processes. (Rubin *et al*., 2009; Tau & Hassen, 2007). A knowledge gap exists on the gender and other factors influencing participation in coffee IPM group processes. Comprehension of how gender and other socio-economic factors influence participation in group processes of a male controlled enterprise like coffee is critical to understanding how to enhance the participation and benefit by women and other categories of farmers from IPM packages. A study was therefore conducted to identify socio-economic factors that influenced smallholder farmer participation in IPM control of the coffee stem borer (CSB) in Elgon Sub region, Uganda. Specifically, the study aimed at understanding the level and determinants of men and women farmers' participation in coffee IPM group processes.

Theoretical Framework

Factors that affect participation in groups: A number of authors categorize participation into various levels based on their normative assumptions (Pretty,1994,1995; Kelly & Van Vlaenderen, 1995). According to Agarwal (2001), participation is passive when a "participant is informed of decisions affecting things past; or attends meetings, assists in decision-making without speaking up", and "active when a "participant expresses opinions whether or not solicited or taking initiatives of other sorts". The author affirms that participation can also be nominal, consultative, activity-specific and interactive, with the later seen as the highest level of participation type. Interactive participation applies when participants have a voice and influence group decisions. Chambers (2005), raises issues about who participates, where, when, with whom and with what equality. In various locations women were found to face significant constraints participating in and benefiting from farmer field schools and other training and extension opportunities as compared to their male counterparts (Jiggins et al., 2000; Gründel, 2009). Research conducted by Subedi (2008) in Nepal found that, in mixed groups women are more constrained in terms of access to all forms of information including extension services, farming inputs, and mobility. This is often due to heavy workloads at home (FAO 2011, 2015 & 2016) and limited access to transport means coupled with long distance to training venues.

Gender and demographic factors: There is evidence showing different levels of participation in different places. In a survey study on factors influencing HIV positive farmers' level of participation in support groups in Nigeria, Jummai (2012) found that women farmers' level of participation in the study area was low. A relationship between gender and farmer groups participation study in Tanzania, found that women participated less in farmer groups than men. This was explained by the lack of a gender mainstreaming strategy for the groups and lack of sensitization on gender issues. Heavy domestic workloads affected women's attendance of group meetings. Emphasis on export crops also limited women's involvement in groups as they lacked control over land necessary to engage in such crops (Towo, 2004). However, Sanginga *et al*., 2001, found that women in East African groups had dominant community roles and responsibilities in relation to activities implemented by the groups making them more likely to participate than men. Beard (2005) found that in Indonesian communities,

women participated less in groups due to cultural limitations on their level of public engagement. Men were therefore more likely to participate in group activities.

Besides gender, a range of demographics characteristic including household size, family labor, age, marital status, household status, educational level of the respondent were found to influence farmers' participation in groups in various countries. Davis *et al*. (2010) found that individuals from larger households in Kenya were less likely to participate in groups than smaller households. Temesgen, Umer & Jamal (2015) found that family labor had a significant positive influence on participation of women in agricultural extension training programs. With regards to age, younger farmers in Uganda, Tanzania and Kenya were more likely to participate in farmer field school groups compared to the older ones (Davis et al., 2010). Benin *et al.* (2008) found that the relationship between age and decision of a farmer to participate in NAADS farmer groups in Uganda was insignificant. Studies by Oxfam, 2013; Agarwal, 2001; Warner *et al*., 1997, found that older women from wealthier households tend to participate more in producer organizations as opposed to the younger ones from poorer households. This perhaps is due to better access to assets and resources by the former.

Educated farmers are better able to process information and search for appropriate technologies to ease their production constraints (Morrison *et al.,* 2007). Consequently, education level and access to information are important factors in promoting participation as well as decision-making as farmers with higher education levels tend to be more open to new technologies. In Kenya, Davis *et al.* (2010) found that, household heads with primary and secondary education were more likely to participate in Farmer Field Schools (FFSs) than those with no education. The same authors however, found contrary results for Uganda. According to Benin *et al.* (2008) farmers with some post-primary education were more likely to participate in groups formed by the national agricultural advisory services program in Uganda. Coleman & Mwangi (2013) found that education significantly affects women's participation in producer organizations of Bolivia, Kenya, Mexico and Uganda. The probability to participate in producer organizations and attend meetings increased with years of schooling.

Economic Factors: Although the findings from the various countries are mixed, possession of assets like arable land, labor, equipment, and wealth status have been found to influence farmers' participation in groups. Sabates-Wheeler (2006) in a study on local strategies for survival and growth in Romania and Kyrgyz Republic found that households with few assets were more likely to join groups than their counterparts who owned more assets. This is contrary to Davis *et al*. (2010) who found that land size was positively related to participation in FFS. In Tanzania, wealthier people were found to be less likely to participate in groups (La Ferrara, 2002). Weinberger & Jütting (2001) and Beard (2005) found that members in the middle wealth category in Pakistan and Chad were more likely to participate in groups. Wealthier women participate in producer groups (Oxfam, 2013; Agarwal, 2001 and Warner *et al*., 1997). Behera & Engel (2006) asserted that in some instances, poor households would rather spend their time on work to generate much needed cash income than participate in groups.

Institutional Factors: A range of institutional factors including organizational goals, membership criteria, group leadership, expected net present value, access to credit, extension services, infrastructure have been found to influence farmers' participation in groups.

At the organizational level, Smith (1994) states that clear goals and a proactive orientation towards change increase participation. Organizational structure does affect who becomes a member and how many become active in the group. In addition, involvement varies by physical labor, time commitment and networking opportunities (Martinez & McMullin, 2004). Datta (2007) recognized that successful community groups in Bangladesh had Strong leadership, were transparent in information-sharing and decision making, had trustworthy and competent leaders and a specific quota for women elected as leaders. At an individual level, mutual trust and respect among the members served as important factors for effective participation. Membership in collectives, referred to as social capital, can give the farmers the opportunity to have better access to information, which is important for participation (Weinberger & Jütting, 2001, p. 1402). Membership in social networks was found to be a positive determinant of participation in groups in Uganda (Beard, 2005; Sanginga *et al.,* 2001 and Weinberger & Jütting, 2001).

Behera & Engel (2006) state that people's participation in a process depends on the expected net present value of the task. Achievement of expected benefits is therefore a key driver of participation as a reward for the participants' efforts (Up Hoff & Wijayaratna, 2000). An enabling institutional framework for local group performance through regulations, infrastructure and logistical support is also vital for people's motivation to participate (Varughese & Ostrom, 2001). In some countries, women are barred from performing certain roles in groups or even participating due to cultural barriers (Beard, 2005); socio-cultural norms and gender perceptions. Women's triple roles (Tanwir and Safdar, 2013; FAO 2010/11; Pandolfelli *et al*., 2007 and Westermann *et al*., 2005) are responsible for time burdens (FAO 2011; FAO 2015) which hinder participation. Marriage as an institution is another great contributor to women's immobility in some contexts (Oxfam 2013; Manfre and Rubin 2012, Gotchi et al., 2009). In Mozambique, married women may not participate in groups without the permission of their husbands (Gotschi et al., 2009).

Group leadership has an influence on participation in groups. Leadership depends on the styles with democratic leadership styles leading to better participation as opposed to exclusionary and autocratic styles (Sseguya, 2009).

Access to infrastructure such as a tarmac road may influence participation in farmer groups. Davis *et al*. (2010) found that distance to tarmac roads was negatively related with participation in a FFS in Kenya, Tanzania and Uganda, suggesting that farmers in remote areas are less likely to take part in the FFS.

The literature shows variations across various contexts and geographical locations regarding the factors that influence participation in groups. From the preceding discussion, despite the theoretical convergence on the general determinants of participation, empirical studies on the subject yield very little in relation to gender dimensions of determinants of participation in traditionally male enterprises like coffee. The implication is that some underlying factors which are contextual may further influence the participation.

Conceptual Framework

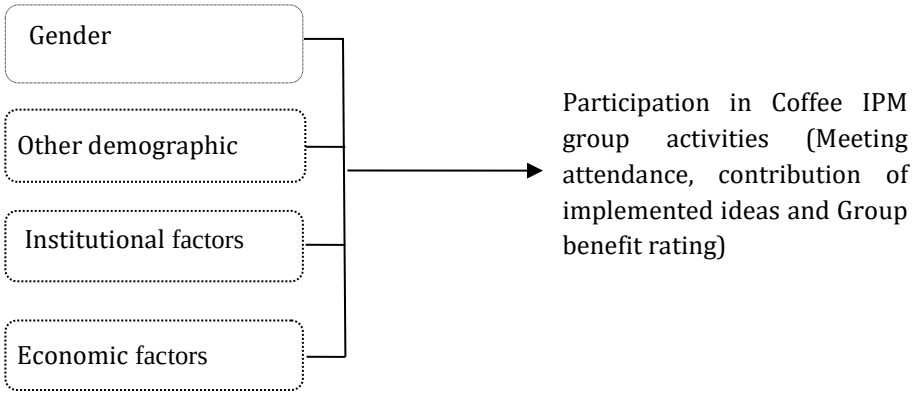

Figure 1. Conceptual frame derived by authors.

Organizing diverse groups should enhance participation for better solving of more complex farm challenges and generate more creative ideas based on invaluable expertise among members. On the contrary, bringing such people together in typical patriarchal society re-enforces imbalances with the minority groups such as women benefiting less from such efforts. Specifically, the questions of who is able participate, where, when, with whom and with what equality glaring (Chamber, 2005; Subedi, 2008). Women in various locations face significant constraints participating in and benefiting from farmer training and extension opportunities compared to men (Jiggins *et al*., 2000; Gründel, 2009). On this basis therefore, participation in mixed sex coffee IPM group processes could be influenced by a range of demographic, economic, and institutional factors.

METHODOLOGY

Study site: The study was conducted in the districts of Sironko & Manafwa in eastern Uganda among members of coffee IPM farmer groups. This region hosted the IPM CRSP project sites which used the group approach to promote IPM practices to control the Coffee Stem Borer

(CSB) (*Monochamus leuconotus*) which is one of the major constraints for the livelihoods of coffee households in the area with an incidence of 28.3% (Kyamanywa *et al.,* 2011). CGIAR (2005) characterized the Sironko Manafwa zone as banana-coffee farming system where mixed farming is predominant. In this region, women mainly engage in production of food crops including beans, groundnuts, sorghum, maize, millet, cassava, potatoes and sweet potatoes, while men dominate in the production of cash crops mainly coffee and cotton. The main source of cash income is sale of crops and livestock. A host of risks are associated with this zone, such as crop and livestock pests and diseases, fluctuating crop prices, soil erosion and landslides in high areas, soil degradation, and high population density. As a result there is increased land pressure.

Research design: The study adopted a cross sectional survey research approach and data was collected in 2 phases between May and July 2012. In the first phase, key informant interviews were conducted to gain in-depth understanding of the group processes and gender issues affecting men and women's participation. Phase two consisted of a cross-sectional survey aimed at obtaining data on the extent of participation in the Coffee IPM groups by both men and women members, and to determine the factors influencing participation.

Population and sampling: The target population comprised of men and women in coffee IPM farmer groups in the target districts. The Integrated Pest Management Collaborative Research Support Program (IPM CRSP) project had worked with 3 groups and all were included in the study. The list of IPM CRSP farmer group members which served as sampling frame was obtained from group leaders. These groups consisted of a total membership of 42 (22 men, 20 women) for Kibowa, 45 (24 men, 21 women) for Kesemulira and 54 (30 men, 24 women) for Sosyo. A census was carried out. A total of 126 (71 men and 55 women) respondents from the three groups were interviewed. A census was preferred because all the three farmer groups formerly farmer field schools had been graduated by the IPM CRSP project and preliminary studies sighted unavailability of some members. This the reason, the FFSs are mentioned as farmer groups in this study.

Instrumentation and data collection: A structured interview schedule that had been subjected to content validation with a panel of experts, and suitability tests through pretesting was used to collect data from the sample. The survey tool was pre-tested in Bumasaba parish in Sironko district, which was comparable population that was not participating in the study. The field testing exercise helped to test for clarity and the logical flow of the questions and duration of the interview. Data quality was ensured through thorough training of enumerators and using enumerators who are proficient in the local dialects. Team debriefs were also held every day after the data collection exercise to share lessons and challenges so as to ensure a uniform interpretation of the household survey questions.

Key informants were interviewed individually in their homes or offices for one to two hours on average. A voice recorder was used to capture the interview/discussion and the recordings were later played to enhance accuracy of the field notes. Survey data was collected by the researchers with the help of the research assistants. Appointments to visit the selected farmers were made and consent was sought prior to the interview. The purpose of the study was clearly explained to the respondents as part of the process of securing informed consent.

Data analysis: To determine the level of men and women farmers' participation in coffee IPM group processes, a descriptive analysis was carried out to generate percentages, means and standard deviation. Independent t tests and chi-square were used to test for differences in means and proportions respectively between the men and the women as separate groups. Ordered probit model was used to estimate the factors influencing men and women farmer participation in coffee IPM group processes using cross sectional data. The problem of multicollinearity among explanatory variables often associated with cross sectional data leading to imprecise parameter estimates was investigated by a correlation analysis between continuous independent variables. Highly correlated variables were dropped from the model. For dummy variables, a chi-square test for independence was used to determine dependencies between variables.

Variable measurement

Estimation of Participation Index for group processes (Dependent variable): Participation was defined as the involvement of men and women farmers in IPM group processes measured using a participation index (PI). The PI was computed based on the number of meetings attended, the number of ideas contributed, and the number of ideas taken, and the rating of the level of

satisfaction with the benefits obtained from Coffee IPM group trainings. The following questions were asked: a) how often did you attend coffee group meetings in the last 6 months? {ATTEND}; b) how often did you get to contribute your ideas in coffee group meetings in last 6 months? {CONT_IDEA}; c) How often were your ideas taken in the group meetings? {IDEA_TAKEN}; d) How do you rate the benefits you obtain from the coffee group trainings? {BEN_RATING}. For questions a-c) the scale used was: 0 = 'Never', 1 = 'Seldom', 2 = 'Frequent' and 3 = 'Very Frequent'; for question d) 0= minimal; 1= fairly satisfied; 2= average or moderately satisfied; 3= highly satisfied. The total score was calculated by adding individual scores that each respondent obtained for all statements. Participation Index was calculated as follows:

$$PI = \sum_{i=1}^{n4} CGPF \ldots\ldots\ldots\ldots\ldots\ldots (i)$$

Where: PI = Participation Index, CGPFSi = Coffee group process frequency score
(0=never, 1=seldom, 2=frequent and 3=very frequent; 0= minimal; 1= fair; 2= average; 3= high) and i = number of Coffee IPM group activities ranging from 1 to 4.

$$PI = \sum_{i=1}^{4} ATTEND + \sum_{i=1}^{4} CONT - IDEA + \sum_{i=1}^{4} IDEA - TAKE + \sum_{i=1}^{n4} BEN - RATING \ldots\ldots\ldots\ldots\ldots\ldots\ldots (ii)$$

Model for estimating men and women participation in Coffee IPM group processes: An ordered probit model was used to capture the factors influencing men and women participation in coffee IPM group processes. The dependent variable in the following participation analysis can take three values 1, 2 and 3, indicating different levels of participation. Due to the ordered nature of the dependent variable the model used was an ordered probit model. The ordered probit model ensures a result that lies within the interval of interest (Wooldridge, 2006). The log-likelihood function is always negative. The ordered probit requires a dependent variable that, as suggested by the name, is ordered, which means that the assigned values are no longer arbitrary but are rather ordered responses taking on values {0, 1, 2….J} In this study, dependent variable Yi is a utility index of participation in group processes where Yi is a function of the different socio-economic activities/factors. The Ordered Probit model is a fairly straight-forward extension of the binary probit model that can be used in cases where there are multiple and ranked discrete dependent variables. In the present study the dependent variable Y takes the values 1, 2 and 3. As in the binary probit model, we define an unobserved index function Y* as:

$$Y^* = X\beta + \varepsilon$$

And assume:

$Y = 1$ if $Y^* < k1$,

$Y = 2$ if $k1 \leq Y^* < k2$,

$Y = 3$ if $k2 \leq Y^*$,

Where k1 and k2 are "cut points" and k1 < k2. Then, the conditional probabilities Pr (Y=1 | X), Pr (Y=2 | X), and Pr (Y=3 | X) can be written as;

$Pr(Y=1 \mid X) = Pr(X\beta + \varepsilon < k1) = Pr(\varepsilon < - X\beta + k1) = F(- X\beta + k1)$,

$Pr(Y=3 \mid X) = Pr(X\beta + \varepsilon > k2) = Pr(\varepsilon > - X\beta + k2) = 1 - F(- X\beta + k2)$,

$Pr(Y=2 \mid X) = 1 - Pr(Y=1) - Pr(Y=3) = F(- X\beta + k2) - F(- X\beta + k1)$,

Where: F is the cumulative distribution function of residual ε. In the Ordered Probit model, it is assumed that the residual ε has the standard normal distribution N (0, 1). Thus, F is the cumulative function of N (0, 1).

Based on the different group processes, the participation index (PI) was constructed as a categorical dependent variable that is seldom, average and high participation. Participation in group processes was measured as a discrete choice variable based on the participation index (PI).

Participation levels were computed on a scale of 1 -3; If the PI is zero or equal to 4 (0-4), the respondent was marked as a low participant in the coffee IPM group processes and thus was categorized as 1 (Yi=1). If the PI is higher than 4 but less than 9, (5-8) the respondent was marked as an average participant in coffee IPM group processes and was categorized as 2 (Yi=2). If the PI is higher than or equal to 9, (9-12) the respondent was marked as a high participant in CSB IPM group processes and was categorized as 3 (Yi=3). This index of participation was expressed as follows:

$Y = \beta o + \beta 1\ GENDER + \beta 2\ RESPAGE + \beta 3\ PPLEFULLTIME + \beta 4\ EXPCOFF + \beta 5\ MARITAL + \beta 6\ DIST + \beta 7 EXT + \beta 8 SOCIALGRP + \beta 9 EDUC + \beta 10\ ACREAGE + \beta 11\ HHSIZE + \beta 12\ CREDIT + \beta 13\ NONFARM + \beta 14\ ECONGRP + e$ …….. (iii)

Where; Dependent Variable (Y) = Participation index of coffee IPM group processes (1= low participation, 2=-

average participation and 3=high participation), βo=value of the regression coefficient.
B1- βn =vectors of coefficients associated with vectors of variables (x) that explain the change in probability to participate in coffee IPM group processes. X1 to X11 = Independent Variables.

Table 1. Description of explanatory variables and the expected sign.

Variable	Description	Sign	Reason
X1	Sex (1= male, 0= female)	+	Men have more access and control over coffee production resources and are therefore more likely to participate. They also have more free time to attend meetings and are accorded higher status in society
X2	RESPAGE (age of the respondent in years)	+	Older farmers are more likely to participate in coffee groups activities than younger farmers because the former grow more coffee since they own more land.
X3	PPLEFULLTIME (total number of household members in full-time farming)	+	Farmers who are involved in farming activities on a full time basis are likely to have a higher motivation to associate with their fellow farmers so as to improve their farming activities as opposed to part-time farmers.
X4	EXPCOFF (Coffee farming experience in years)	-	Farmers with more experience are less likely to participate due to less open-mindedness and receptivity to new ideas
X5	MARITAL (1=married, 0=otherwise)	+ -	Marital status is an institutional factor that shapes access to resources (economic, social, etc.). Given the role sharing among married couples, it is easier for one spouse to participate in group activities as the other is involved in other chores. On the other hand, unmarried women are likely to be more independent with fewer restrictions for association and participation.
X6	DIST (Distance to coffee IPM demonstration site in kilometers)	+	Close proximity to the coffee demonstration site eases access to coffee IPM information thus motivating farmers to participate in group processes.
X7	EXT (Access to extension=1, 0=otherwise)	+	Farmers who have access to extension services are more likely to participate in IPM IL group processes due to their experiences of participating in previous extension group events.
X8	SOCIALGRP (membership in a social group=1, 0=otherwise)	+/-	Farmers who have had bad experiences in social groups are less likely to join IPM farmer groups while those who have benefited from such groups are more inclined to join IPM group processes
X9	EDUC (highest level of education in years)	+	Highly educated farmers are more likely to join IPM group processes because they have higher motivation to get new information, knowledge and skills.
X10	ACREAGE (total coffee acreage in acres	+	Large scale farmers have a higher motivation to look out for new information sources compared to small-scale farmers.
X11	HHSIZE (household size)	+/-	Large households have more needs which puts pressure on the household head to join groups so as to receive the attached benefits. On the other hand, large households where much of the members' time is spent in other

			activities such as schooling and non-farm activities are less likely to join farming groups
X12	CREDIT (access to credit=1, 0=otherwise)	-	Farmers who have access to credit are less likely to join groups because they have access to the resources needed to undertake their production.
X13	NONFARM (1=participation in non-farm income activities, 0=otherwise)	+	Participation in non-farm income generating activities increases the social networks of the farmer which increases the motivation to join groups.
X14	ECONGRP (membership in an economic group=1, 0=otherwise)	+	Involvement in economic groups increases farmers' business management, entrepreneurial and marketing skills enhancing their propensity to participate in IPM group processes.

RESULTS AND DISCUSSION

How gender influences participation. Analysis of level of participation as measured on the individual items of the participation index, (in form of attendance of meetings, contribution of ideas during meetings, ideas implemented, and rating on the level of satisfaction with the benefits from IPM training) reveals that women participated less in the IPM group processes for controlling the coffee stem borer compared to men (Table 2).

Overall, about 53% of the respondents had frequently attended group meetings but attendance was skewed in favor of men with 56% of all men having attended meetings as opposed to 50% of all women. About 49% of all respondents indicated to have frequently contributed ideas. A break down by sex revealed that men were in the lead with 58% reporting to have contributed ideas frequently in group meetings compared to 37% of the women. When it came to implementation, men's ideas were more frequently adopted (about 58%) compared to 40% for women. About 49% of all respondents indicated to have frequently contributed ideas. A majority of group members had benefited from coffee IPM groups (about 81%) but slightly under a half (about 49%) were men. The major benefit was knowledge/skills (about 98%) with more men benefiting (about 59%).

There was a significant difference between men and women with regard to meeting attendance (independent t test of t (122) =1.875, $p<0.1$). Regarding number of ideas contributed, men again took a lead with a significant independent t-test difference of t (123) =3.489, $p<0.01$. Number of respondents who benefited from coffee IPM groups, like all the above parameters had a significant independent t-test difference of (t (124) =2.945, $p<0.01$).

Gender analysis of the scores on the composite participation index also revealed significant gender gaps. Results in Table 3 reveal that, among the high-level participants, about 47% were men as compared to women (about 26%).

On the other hand, among the low-level participants, a majority were women (about 49%) compared to men (about 9%). Pearson chi-square tests showed significant difference in the proportions at $p<0.05$ implying a significant difference between men and women's level of participation in the CSB IPM group activities. The findings from the survey were collaborated by the qualitative findings from field observation and key informant interviews. Virtually for all the 4 group meetings attended by the researchers, women were fewer than men.

Key informants attributed women's low attendance to restrictions on women's mobility and membership in mixed sex groups by their husbands. It was reported that the reason for the restrictions was that some men feared that their wives would pick up bad habits from other women and start disobeying their husbands. In addition, some men thought their wives would divulge family secrets in the group and/or engage in extra-marital affairs. Men also feared that women may not be able carry out their home chores if they join such groups. One man's response to the question on why more women did not attend one of the regular group sessions was: "If they were here then who would be taking care of the homes?" This shows how women's reproductive roles undermine their participation in group processes. The above qualitative findings illustrate that the gender gap in group participation is largely explained by women's disempowered status in the household. It also implies that women are viewed by men as having a

supporting role to men and thus not accorded priority to attend training sessions. Restrictions on women's mobility is further elaborated from the findings that women could only move freely to water points ($\bar{x}$=29.2) and trading centers ($\bar{x}$=10.3) to either sell or purchase items for home consumption. Only a few women could move freely to the trainings venues (3 times), attend meetings (mean=3.2), visit someone in another village (mean=3.2) which are major points for IPM information dissemination.

Table 2. Participation in group meetings.

Participation parameters		Gender of the respondent		% Over all
		% of men (n=71)	% of women (n=55)	
Attended meetings in the last 6 months	Never	7.14	18.52	12.10
	Seldom	24.29	24.07	24.19
	Frequently	55.71	50	53.23
	Very frequently	12.86	7.41	10.48
Contributed ideas	Never	9.86	29.6	18.4
	Seldom	22.54	29.63	25.6
	Frequently	57.75	37.04	48.8
	Very frequently	9.86	3.7	7.20
Ideaswere implemented	Never	8.45	29.9	17.46
	Seldom	25.35	25.45	25.4
	Frequently	57.75	40	63
	Very frequently	8.45	5.45	7.14
Rating of the benefits obtained from the coffee group trainings	Minimal	30.77	29.79	30.36
	Fair	33.85	10.64	24.11
	Average	16.92	31.91	23.21
	High	18.46	27.66	22.32

Table 3. level of farmer participation in CSB IPM group processes (n=126).

Participation level	Gender of the respondent		(%) Overall
	(%) Men	(%)Women	
Low	26.8	49.1	36.5
Average	26.8	25.5	26.2
High	46.5	25.5	37.3

Pearson chi^2 (2) = 7.9258 P = 0.019

Stringent group membership requirements, notably, payment of membership fee and timing of meetings also hindered women's participation in the group meetings. The group meeting times of 9a.m to 10 a.m. and 2-3 p.m. though earlier agreed upon by both men and women, was found not to favor women who were more involved with domestic work. Literature has revealed that 85–90% of African rural women's time is spent on domestic and other care activities such as childcare, water and food collection, cooking (FAO 2011; FAO 2015). Furthermore, lack of sensitization about these gender issues by the IPM program and the domestic workloads hindered women from attending group formation meetings. In addition, the nature of the enterprise affected women participation. Coffee is a commercial crop which often has less women's involvement because they lack control over key production resources like land. Women mostly grew maize (about 30%), beans or soy beans (about 24%) and banana (about 23%), vegetables (about 17%) and coffee (about 7%).

Though the score among men in all the four participation parameters was less than 50%, the study found that their capacity to attend group meeting, contribute accepted ideas and benefit from group processes was higher compared to women. According to Narayan (1999), differences in power and status in a society can lead to discontentment as some members are excluded from active participation in group activities. In

Mozambique, more husbands than wives participated in a producer organization (Gotschi *et al.,* 2009). The lower participation of women in group activities compared to men is consistent with results from other studies. For instance, level of women farmers' participation in support groups in Nigeria was low (Jummai, 2012). In the relationship between gender and farmer groups in Tanzania, Towo's (2004) study found that women participated less in farmer groups than men due to most groups putting emphasis on export crops which often have less women's involvement because they lack control over key production inputs like land.

Table 4. Non-continuous variables.

Variable	Proportions			
	Men (n=71)		Women (n=55)	
	Yes	No	Yes	No
Marital status	71.8	25.4	74.5	28.1
Extension access	77.4	22.5	85.4	14.5
Sourced money to finance coffee production	28.1	69.0	41.8	58.2
Membership in social group	43.7	56.3	68.5	31.4
Membership in economic group	45.0	54.9	39.6	60.4
Involvement in non- farm activities	53.5	46.5	61.8	38.1

Table 5. Continuous variables, n (m=71, w=55).

Variable	Men	Women	T	p-value
	Mean	Mean		
Age	53.0 (1.65)	45.0(1.67)	3.322	0.0012
Educational level	7.01(0.42)	6.58(0.41)	-0.715	0.4759
House hold size	4.9(0.2)	4.1(0.26)	-2.131	0.0350
Number of people who help out with coffee work	4.52(0.42)	4.65(0.50)	-0.203	0.8395
Total coffee acreage	1.922(1.14)	1.630(0.90)	-1.558	0.122
Experience growing coffee (Years)	23.98(1.89)	18.78(1.54)	2.043	0.0431
Distance to the demo site	1.1(0.1)	0.7(0.09)	-2.448	0.0157

Key: Standard deviations in parentheses.

Determinants of level of participation in group processes: The survey results showed that 56% of the respondents were men while 44% were women. As for educational level, men had spent on average 7.01 years in school as compared to 6.58 for women. The overall range of years spent at school was between 0 to 16 years. About 73% of the respondents were married with a slight difference between men and women. More women were married (about 75%) compared to men (about 72%). More women (about 85%) compared to men (about 77%) had been visited at home by IPM CRSP agents in the past six months. With respect to access to credit, slightly more women (about 42%) sourced credit to finance coffee production from the bank (about 18%) as well as friend/relatives (14%) compared to men (about 28%) with the same sources, while those who did not borrow cited fear of debts as a major obstacle to credit acquisition especially by men (about 16% men and 11% women). Also, more women (14%) compared to men (about 9%) borrowed from friends, bank and neighbors/relatives to finance coffee IPM activities. Another important finding is that women (about 17%) have almost equal access to credit from the bank as a formal source as men (about 19%). Besides the IPM groups, the coffee farmers belonged to other groups formed for social (about 44% for men and 69 % for women) and economic (about 45% for men and 40 % for women) purposes. Economic groups included village Rotating Savings and Credit Associations (ROSCAs) and Savings and Credit Cooperative Organizations (SACCOs). There was no significant difference in the proportion of men and women who belonged to economic groups.

More men had access to off- farm income (about 62 %) than women (about 54%) with selling of crop produce taking lead (28% of men and 25% of women) followed by operating a shop/business (about 9%). The income obtained from off-farm activities was entirely used to cover domestic expenses and not for improving coffee production.

Men had a mean age of 53 as opposed to women who were on average 45years. There was a significant difference between the mean ages of men and women (at $p<0.05$).

Men had a mean coffee farming experience of about 24 years and maximum of 60 as opposed to women who had an average experience of 19 years and a maximum of 50 years. There was a significant difference in the mean years of experience between men and women (at $p<0.05$) implying that women coffee farmers were significantly less expereinced compared to men. There was no significant difference in coffee acreage of men and women.

The average family labor involved in coffee production was four. Both family and hired labor (about 38% of men and 29 of women) is used in coffee farm households.

The average distance in kilometers from a farmers' home to the coffee demonstration site was ($\bar{x}$=1.1) for men as opposed to ($\bar{x}$=0.7) for women; and the difference was statistically significant (t (124) =-2.448, $p<0.05$).The results show that as expected, men were able to travel a longer distance to come to the demo sites while for women, only those close to the demo site participated.

Econometric model results: The following factors were hypothesized to influence participation in coffee stem borer IPM group processes; farmer's gender, age, education level, marital status, house hold size, coffee acreage, coffee farming experience, number of family members who provide coffee labor, membership in social and economic groups, distance from home to the coffee IPM demonstration site, number of IPM IL extension agent visits to a coffee farmer's home, sourcing money to invest in coffee production and non-farm income.

The results of the marginal effects from the ordered probit model on the participation of farmers in the Coffee IPM group processes are presented in the table 6. The regression results indicate that being a man, access to extension, having non-farm income generating activities, membership in an economic group, age of the farmer and number of household members providing full time agricultural labor are positively and significantly associated with increased participation of farmers in the CSB IPM group processes. On the other hand, experience in coffee production and household size are negatively and significantly associated with high participation of farmers in the coffee IPM group processes.

Results reveal that, being a man increased the probability of farmer participation in coffee IPM group processes by about 34%. Perhaps, this finding could be explained by two major reasons. Firstly, coffee is a major income generating crop in the study area and in many other coffee growing areas of the country and like all income generating crops coffee is dominated by men. The second reason is attributed to household headship. In Uganda, the household heads are the decision makers on most of the income generating activities. The said household status also comes with privileges on the side of men. This reasoning is justified by the findings from the study area that show that 91% of the households surveyed were male headed. In fact, 54% of the men made all decisions related to use of coffee revenue with a chi-square significant difference at $p<0.05$. Men also had more access to (56%) and control over (69%) coffee revenue than women. These results are in agreement with an earlier study by Beard (2005) who found that gender of a household head is a determinant to participation. On the contrary, another study by Sanginga *et al.* (2001) found that women in East African groups had dominant community roles and responsibilities in relation to activities implemented by the groups making them more likely to participate than men.

Women's level of participation is likely to be influenced by the nature and sex composition of the group and types of activities engaged in.

Table 6. Determinants of men and women farmer participation in coffee IPM group processes.

Variable	Marginal Effects for low participation (Standard Error)	Marginal Effects for average participation (Standard Error)	Marginal Effects for high participation (Standard Error)
Sex of the respondent	-0.3422871*	0.0078045	0.3344826*
	(0.08451)	(0.03194)	(0.07987)
Age of the respondent	-0.0093716**	-0.0003798	0.0097515**
	(0.00443)	(0.00097)	(0.00449)

People who provide full time coffee labor	-0.0412653* (0.01208)	-0.0016724 (0.00439)	0.0429377* (0.01313)
Coffee growing experience	0.0102097** (0.00439)	0.0004138 (0.00107)	-0.0106235** (0.00448)
Marital status of the respondent	-0.0409449 (0.10584)	-0.0006562 (0.00428)	0.0416011 (0.10496)
Distance from home to the coffee demonstration site	0.0417671 (0.03679)	0.0016928 (0.00456)	-0.0434599 (0.10496)
Extension access	-0.2337081*** (0.12266)	0.0287464 (0.03827)	0.2049616** (0.0916)
Highest educational level	-0.0144671 (0.01319)	-0.0005863 (0.00151)	0.0150534 (0.01346)
Household size	0.0379771*** (0.02206)	0.0015391 (0.00406)	-0.0395163*** (0.02295)
Total coffee acreage	-0.0065537 (0.02101)	-0.0002656 (0.00106)	0.0068193 (0.02182)
Credit access	-0.0992052 (0.0821)	-0.0082445 (0.01474)	0.1074497 (0.09229)
Non-farm income activities	-0.1509989*** (0.09104)	-0.0017074 (0.01541)	0.1527063*** (0.08793)
Social group membership	-0.0858045 (0.09013)	-0.0025075 (0.00903)	0.088312 (0.09206)
Economic group membership	-0.2576803* (0.07742)	-0.0232659 (0.02962)	0.2809462 (0.09035)
Log pseudo likelihood	105.69581		
Number of observations	124		
Waldchi^2(14)	62.13*		
PseudoR^2	0.2145		

The reference category is: correct *Significant at α = 0.1; **Significant at α = 0.05; ***Significant at α = 0.01

The age of a farmer positively and significantly influences participation in coffee IPM group process at 5% significance level. A one unit increase in the age of a farmer increases participation in the coffee IPM group by about 1%. This may be explained by the nature of the coffee enterprise which being a long-term perennial crop tends to attract older people who have more access to and control over land compared to the younger people. This finding, points to a need to employ suitable interventions that seek to enhance participation of youth in the coffee IPM group processes. Other studies found a relationship between age and farmer participation in groups in Uganda, Tanzania, Romania and Kyrgyz Republic (Davis et al., 2010; Benin *et al.,* 2008; Towo 2004 and Sabates-Wheeler 2006). The study results are also consistent with those of Fonjng & Fongkimeh (2007) that demonstrated that farmers are highly involved in agricultural production in their late reproductive and productive (ages) life compared to relatively young farmers. Older women from wealthier households tended to participate more in producer organizations (Oxfam, 2013; Agarwal, 2001 and Warner *et al.,* 1997) probably because of greater access to assets and resources compared to younger and poorer women. However, the study results are not in agreement with other studies such as Ekunwe & Emakaro (2009), who argue that farmers within the age group of 30-50 years are believed to be active in agriculture. Davis *et al*., (2010) also found that in East Africa (Tanzania, Kenya and Uganda), younger farmers were more likely to participate in farmer field school groups than the older farmers possibly because of the attractive nature of enterprises promoted in the FFSs.

Number of household members (household size) who help out with coffee production activities negatively and significantly influences participation in coffee IPM group

process ($p<0.1$). The finding implies that an increase in the number of people living in the household by one person/member decreases the probability of having a high participation of farmers in the coffee IPM group processes by 4%. Perhaps this could be attributed to the involvement of household members in different household income generating activities reducing their interests in coffee groups. This reasoning is related to the finding that despite over 60% of the respondents reported sharing in all coffee tasks not all are willing to be members in the IPM coffee groups. The finding is in congruence with an earlier study by Davis *et al*., (2010) who found that larger household sizes in Kenya were less likely to participate in group processes than smaller household sizes.

Farmers' belonging to an economic group positively and significantly influences farmer participation in coffee IPM group process ($p\leq0.01$). Being a member in an economic group increases the likelihood that a farmer will participate highly in coffee IPM group processes compared to the non-economic group members by about 28%. The probable explanation would be that membership in economic groups enables farmers to appreciate the benefits of groups and enhances their capacity to participate. These results are consistent with earlier findings by Sanginga *et al.,* (2001); Weinberger & Jütting (2001) and Beard (2005) who found that membership in social networks was a positive determinant of participation in groups.

Another variable hypothesized to influence participation in coffee IPM group processes is access to extension measured in terms of whether a farmer received a home visit from the IPM CRSP project extension worker in the past 6 months. Results in Table 6, show that farmers' access to extension services increased the probability of having a high participation in the coffee IPM group processes by 20%. The probable explanation is that personal contact with the extension worker through home visits tends to motivate farmers to participate in the groups.

Non-farm income also positively and significantly influenced participation in the Coffee IPM group processes at 10% level. The study results show that having non-farm income generating activities increases the probability of having a high participation in the coffee IPM group processes by about 15%.

Experience in coffee production negatively and significantly influences participation in coffee IPM group processes at 5% level. Results show that an increase in the experience of a coffee farmer by one year decreases the probability of having a high participation by 11%. This finding is expected given that experienced farmers have a great deal of knowledge and skills in undertaking coffee production. Thus, they are less inclined to join coffee IPM farmer groups compared to inexperienced farmers.

The total number of household laborers involved in full-time farming/agricultural production positively and significantly influences participation in IPM group processes at 1% level. This implies that an increase in the total number of full-time household laborers is associated with an increase in high farmer group participation by about 4%. This finding is expected given that full-time agricultural laborers are more likely to seek information sources that they can use to boost their agricultural production as opposed to part-timers. Such farmers are more willing to cooperate with other farmers and to take advantage of social capital to improve their farming activities. Women specifically find this as relief of their time to participate in groups activities. No wonder, Temesgen et al. (2015) found that family labor influenced women's participation in agricultural extension training programs.

CONCLUSION AND RECOMMENDATIONS

This study set out to determine the level of farmer participation in mixed sex coffee IPM group processes and factors influencing participation. Results revealed that the level of men's participation in coffee IPM group processes was significantly higher than women's. The study concludes that men's position in the society gives them a greater opportunity to attend group meetings, contribute ideas that are taken during such meetings and obtain more knowledge of CSB IPM practices. Being an older man with high coffee farming experience, membership in economic groups, access to IPM CRSP extension services, large number of household labor and with non-farm income generating activities significantly and positively influenced group participation. The study concluded that research and development approaches that utilize groups should carry out a gender analysis aimed at identifying and addressing women's strategic needs and barriers to participation and benefit from commercial enterprises such as coffee and group processes. The approaches should use inclusive methods suited to women, younger farmers and those with limited experience in coffee production, no off-farm

income options and those not in groups. Secondly, dialogue/information exchange between men and women should be undertaken for fairer sharing of the coffee IPM group benefits. Finally, in order to enhance farmer group participation, interventions should target averagely experienced coffee farmers who undertake both on-farm and non-farm income generating activities.

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