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The Contribution of Agricultural Marketing Co-operative Societies to Farmers' Livelihoods in Mvomero and Kilombero Districts, Tanzania

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Abstract

Collective action through Agricultural Marketing Co-operative Societies (AMCOS) is a significant tool for improving smallholder livelihoods; hence, contributing to farmers' economic development. AMCOS provides a favourable atmosphere for an effective government aid scheme, farm input supply, and mobilization of funds from external support services organizations. However, farmers are facing many challenges, such as inadequate access to agricultural credit, market linkage, information, inadequate technologies, and underperforming markets. There are mixed findings on whether or not agricultural cooperatives improve members' livelihoods. Therefore, this study evaluated the contribution of AMCOS to members' livelihood outcomes and constraints for sustainable livelihood development. A total of 340 respondents were interviewed. The findings showed that AMCOS members had higher outcomes in some livelihoods than non-members of AMCOS. In addition, AMCOS contributed to members' income and some of the assets. Lastly, stakeholders pointed out inefficient service delivery, inadequate skills of co-operative managers, and district co-operative officers' interference in AMCOS business, which deprived members of co-operative autonomy, as constraints facing AMCOS to enhance sustainable livelihoods for members. Therefore, the study recommends that AMCOS management improve service delivery and plan for continuous staff development. Also, District Co-operative Officers should observe co-operative principles and values in executing their duties.

1. INTRODUCTION

Most countries in Africa depend largely on the agriculture sector for their livelihoods (IFAD 2011), and indeed the sector is considered the main pathway to livelihoods improvement in African countries (Asfaw et al., 2012; Christensen et al., 2011; Dawson et al., 2016) Agricultural production in sub-Saharan Africa (SSA) has stagnated over the past forty years, averaging only 2.4%, while that in other third-world nations has increased by 4.0%, according to a study by Tittonell and Giller (2013). This is because SSA has lagged behind in agricultural sector development. Mhembwe, & Dube (2017) noted that at least 40% of the households in Africa are members of cooperative societies. Thus, when taken as a whole, the cooperative movement is taken to be Africa's biggest non-governmental organization (NGO) and they significant role in many national economies and have created a great number of self-employment opportunities in Africa.

In Tanzania, like in other developing countries, agriculture plays a central role in the economy. The sector accounts for about 70.0% of all employment and about 24.0% - 30.0% of all export earnings in the country. About 75.0% of Tanzania's population live in rural areas and depend on agriculture for their livelihoods and as a source of employment (URT, 2016). Therefore, the agriculture sector determines the fate of the economy of the country in general. Despite its economic importance, smallholder farmers who live on the threshold of subsistence farming dominate the sector. Moreover, their agricultural production system depends on poor

technologies worsened by inadequate credit access, performing market systems and marketing linkages and other poor infrastructure (Gebremedhin et al., 2009). Smallholder farmers can overcome these challenges by working co-operatively for collective strength, which they cannot practice as individuals. This would be a pathway out of powerlessness leading to improved livelihoods (Birchall & Simmons, 2009 and Mhembwe & Dube (2017). Therefore, farmers need to be organized into co-operative organisations which are member-based and owned business organizations that offer an institutional structure through which members could own and control production, processing and marketing activities (Davis, 2008).

According to Abebaw and Haile (2013), co-operatives dealing with agricultural activities improve farm production through their roles in the adoption of productivity-enhancing technologies. Improvement in agricultural production is necessary for enabling farmers' livelihoods, rural poverty reduction, and increasing farmers' food security (Shiferaw et al., 2014; Asfaw et al., 2012). In addition, according Markelova and Mwangi (2010) membership to a co-operative society improves commercialization behaviour among smallholder farmers. In return commercialization will improve farm productivity and income from farming at micro- and macro-levels, and will increase food security. Co-operative also reduce transaction costs and break information barriers by empowering farmers' bargaining ability (Trebbin, 2014).

However, there are some cases where agricultural co-operatives do not make farmers' situation better. For example, a study by Higuchi (2014) in Peru on members' and non-members' production of cocoa showed that farmers' membership in co-operatives, as their main sales channel, did not influence cocoa production in any significant way. The study showed further that non-members harvested somewhat larger volumes of cocoa beans than did members of co-operatives. Another study by Masunga (2014) in Musoma Municipality in Tanzania showed that being a member of AMCOS did not improve productivity of smallholder farmers, as there were no differences in terms of yields, income, and wellbeing between members and non-members. Lastly, a study by Thomson et al. (2008) in Ethiopia, Kenya, and Malawi showed that some collective organizations had improved members' livelihoods, and that some had partially while many others failed to do so. Given the government's attempts to promote the development of the cooperative sector, these contradictory findings call for additional research to determine the effect of Agricultural Marketing Co-operative Societies on livelihood outcomes of smallholder farmers in the Tanzanian setting.

2. METHODOLOGY

2.1 Description of the study area

The study was done in Mvomero and Kilombero districts. The districts were selected because they had many active agricultural marketing co-operative societies compared to other districts in Morogoro Region. In addition, there were other cash crops (sugarcane and cocoa) which were previously not covered by AMCOS' traditional cash crops such as tea, coffee, cashew nuts, and cotton.

2.2 Research design, sampling procedures and sample size

The study employed a cross-sectional research design. The design was adopted based on the fact that it allows the collection of both quantitative and qualitative data. In addition, cross-sectional research design allows comparison of two or more groups in terms of their opinions, attitudes, beliefs and practices (Creswell, 2013). Therefore, in this study, the design enabled a comparison of members of AMCOS and non-members. The unit of analysis was members and non-members of AMCOS in Kilombero and Mvomero districts.

The study adopted multi-stage sampling strategy as follows: the first stage was the selection of the study area whereby two out of six districts were purposively selected in Morogoro Region. The second stage involved a random selection of six out of 17 active AMCOS. This was followed by the third stage of selection of Mhonda, Mtibwa (Lungo) and Diongoya (Kwadoli) wards in Mvomero District and Kidatu A, Kidatu B and Mang'ula wards in Kilombero District. Lastly, the selection of the study respondents was done through systematic random technique for non-members and members of AMCOS who were selected from a list of members of AMCOS. The sampling frame was lists of members and non-members of AMCOS in the study area. Therefore, the sample of the study constituted both members and non-members of AMCOS.

The sample size of the respondents (both members and non-members) in the six wards

was determined using Yamane (1967) formula as indicated in Equation (1).

$$n = N/1+ N (e)^2 \quad (1)$$

Where: n= the sample size, N= the population size of households in seven study area villages, which is estimated to be 11 000 households, e= the level of precision (an error of five percent assuming 95% confidence level). Therefore, drawing from Equation 4.1, the sample size was 340 respondents. The proportional formula was used to compute the sample size for members of AMCOS from the general formula. The formula for sub-sample members of AMCOS is as shown in Equation 2.

$$Nh/n = Nh/N \quad (2)$$

nh=Sub- sample, n= total sample size= 40, Nh= sub-sampling frame/population=3874, N= sampling frame (population) = estimate of 11 000. Therefore, the sample size was 218 and 182 households for members and non-members of AMCOS respectively. However, only 189 out of 218 members and 151 out of 182 of non-members were available for the study. Therefore, the total sample size for this study was 340 out of 400 respondents proposed earlier. For qualitative data, four focus group discussions (FGDs) sessions were conducted, two from each district for members and non-members of AMCOS and six key informants (KIs) were interviewed including two co-operatives' managers from each district and one co-operative' officer from each district.

2.3 Method and instruments for data collection

The study adopted survey interview, Focus Group Discussion (FGDs) and in-depth interview methods of data collection. A questionnaire was used to collect quantitative data on use of agricultural inputs, income from agricultural production, assets values and food expenditure. Checklists were used to collect qualitative information during Focus Group Discussions (FGDs) and in-depth interviews with key informants. Data collected were on the AMCOS contribution to food security, the assets acquired, and on AMCOS constraints to sustainable livelihoods.

2.4 Data analysis

Quantitative data were analysed using descriptive and inferential statistics whereby chi-square, probit model and propensity score matching (PSM) were computed. Descriptive statistics were used to construct cross-tabulations and frequency tables to compute means and percentages. Compare means was computed to compare livelihood outcomes averages (Income, Assets, and Food crop production) of members and non-members of AMCOS. Chi-square was computed to compare food accessibility by members and non-members of AMCOS. The analysis was computed through Statistical Package for Social Science (SPSS) and STATA software. In determining the contribution of AMCOS to members' livelihoods outcome, Propensity Score Matching (PSM) was conducted. According to Becker and Ichino (2002), PSM is a two-step procedure. At first, a probit regression model is computed to determine the likelihood of farmers to become a member of an agricultural marketing co-operative society, and in the second step PSM is computed through STATA software to determine the estimated effect of being a member of an agricultural marketing co-operative society in comparison to the non-members. Below are procedures and steps.

$$Y (1;0) = \beta_0+ \beta_1X_1+ \beta_2X_2+ \dots \beta_{14}X_{14} \quad (3)$$

Where: Y is a response variable (1 = member of agricultural marketing co-operative society and 0 = non-member), β is the regression coefficient to be estimated, and X is an independent variable to be explained.

After determining the probability of farmers joining the AMCOS through Probit model, the second step is to estimate the propensity score to determine average treatment effect of being member of agricultural marketing co-operative societies based on the following equation:

$$P \text{ core}= 1/ [1 + e-(\beta_0 + \beta_1X_1 + \beta_2X_2+ \dots\beta_{14}X_{14}] \quad (4)$$

Where, $(\beta_0 + \beta_1X_1 + \beta_2X_2 + \dots \beta_{14}X_{14})$ was used in the probit regression model as shown in Equation (3).

According to Rosenbaum and Rubin (1983), propensity score was defined as the probability of receiving treatment assignment condition of observable baseline characteristics. After the propensity score is estimated, each member of agricultural marketing co-operative society was matched with non-members with similar propensity score values with the aim of determining the average treatment effect on the treated (ATT). The equation below was used to compute ATT:

$$ATT = E (Y_1–Y_0|x, D=1) = E (Y_1|x, D=1) – E (Y_0|x, D=1) \quad (5)$$

Where: D is an indicator variable equal to 1 if the farmer is a member of an agricultural marketing co-operative society, Y1 is the members' outcomes, Y0 is the non-members' outcomes and x is a vector of the control variables. Outcome variables used by this study were agricultural income, assets (in TSH), food expenditure, rice, and maize produced for consumption in kilograms.

After matching, a balancing test is required to verify that the differences in the control variables between the member group and the non-member group have been eradicated, in which the matched comparison group could be regarded as a credible counterfactual (Ali and Abdulai, 2010). Even though there are many kinds of balancing tests, the most commonly adopted is the mean absolute standardized bias (MASB) method. Therefore, the MASB approach was used as recommended by Rosenbaum and Rubin (1983), in which the standardized difference should be smaller than 20% to prove the success in the matching procedure. Qualitative data were coded, grouped according to themes then analysed through content analysis.

3. RESULTS AND DISCUSSION

3.1 Differences in livelihood outcomes between members and non-members of AMCOS

Table 1 compares the livelihood outcomes between members and non-members of AMCOS in the study area. These outcomes were income, assets, and food security. Total incomes from agriculture between members and non-members of AMCOS were statistically significantly ($p \leq 0.05$) different. The average income was Tshs 5 117 475 and Tshs 3 507 914 for members and non-members respectively. The findings imply that members of AMCOS had higher income than the non-members. The net income from agriculture was another farm income studied. The average net income was Tshs 4 067 603 and Tshs 2 814 093 for members and non-members respectively and was statistically significantly ($p \leq 0.05$) different.

Generally, agricultural marketing co-operative societies commercialize agricultural produce and create income generating opportunities by agricultural services support, which encourage surplus production and facilitate marketing

Table 1. Comparison of livelihood outcomes between members and non-members of AMCOS

	Members		Non members		P-Value
Item	**N**	**Average (TShs)**	**N**	**Mean (TShs)**	
Income from Agriculture	189	5 117 475	151	3 507 914	0.050**
Net income	189	4 067 603	151	2 814 093	0.049**
Input Expenditure (Tshs)	189	1 049 872	151	693 821	0.036**
Annual food expenditure (TShs)	189	1 454 400	151	1 443 960	0.948
Rice harvested in kg	163	1 885	123	1402	0.249
Maize harvested in kg	119	1 359	95	1 263	0.658
Land owned(hectares)	186	9.4946	115	5.5043	0.011**
Bicycle Value	150	148 693	109	136 886	0.594
Motor cycle Value	57	1 528 684	23	1 473 478	0.710
Knapsack sprayer Value	80	59 588	39	72 744	0.239
Motorized sprayer Value	12	417 500	3	410 000	0.961
Radio Value	121	60 764	91	34 192	0.013**
Sewing machine Value	25	117 680	6	165 833	0.287
Television Value	64	339 266	22	266 364	0.350
Car Value	1	1 500 000	2	4 750 000	0.557
Tractor Value	3	19 666 667	1	24 000 000	0.821
Animal keeping Value	121	819 843	65	417 846	0.412
House Value	174	5 384 167	120	2 620 500	0.000*

**= significant at p ≤ 0.01 and ** = significant at p ≤ 0.01*

channels. These findings are similar to the findings reported in a study by Getnet and Annullo (2012) in Ethiopia which revealed that agricultural co-operatives services significantly influenced the income generated by farm households.

The study also aimed at determining agricultural expenditure (farm inputs expenditure) by both members and non-members of AMCOS. The average expenditure for members and non-members were Tshs 1 049 872 and Tshs 693 821 respectively. The difference was statistically significant ($p \leq 0.05$) different implying that members of AMCOS spent more than non-members on farm inputs which in turn enabled them to get higher yields. This finding is in line with the findings reported by Yehulashet (2011) in Ethiopia, which revealed that agricultural co-operatives increased import and supply of chemical fertilizers and improved seed to members, which as a result increased their production and ultimately improved their livelihoods. However, the findings are in contrast to Getnet and Annullo (2012) argument that the negative sign is expected to members of agricultural co-operatives on input spending variable because users' spending on agricultural inputs tends to be reduced because of bulk purchase by agricultural co-operatives at a lower unit price in relation to inputs purchased from private traders.

The average annual food expenditure in the study area was TShs 1 454 400 and TShs 1 443 960 for members of AMCOS and non- members respectively. The findings were not statistically significant different, implying that food expenditure between the members and non-members was the same. In the area of study, food crops were maize and rice, hence the study was interested to find out the quantity of production of the two crops. The average per capita amounts of rice harvested in the year 2018 were 1885 kg and 1402 kg for members and non-members respectively. For maize, the amounts in the same year were 1359 kg and 1263 kg for members and non-members of AMCOS respectively. The difference in the production of both food crops (maize and rice) for the two groups was not statistically significantly different. This is in contrast to the findings by Ahmed and Mesfin (2017) in Ethiopia who found that the difference in the total food crop production between members and non-members of agricultural co-operatives was statistically significant as members had higher food crop production than non-members.

Finally, a comparison was made of the value of assets owned by members and non-members of AMCOS. About 12 livelihood assets were assessed, and only three of these were statistically significantly different. These included the land owned, the value of a radio, and the value of the house owned. The average land owned by members and non-members of AMCOS was about 9.5 and 5.5 hectares respectively. The difference was statistically significantly ($p \leq 0.05$) different. This implies that members of AMCOS owned more land than non-members. The findings have an impact on output since greater acreage means more cultivation over time, which increases harvest. The findings are similar to those reported by Balgah (2018) in a study in Cameroon which showed that members owned significantly larger farm sizes as opposed to non-members. The average value of radio asset owned by members and non-members of AMCOS was Tsh 60 764 and Tsh 34 192 respectively; this implies that members of AMCOS owned radios with higher value than did non-members. Radio was an important asset to farmers in the study area as it is an important source of information on market price, technologies, and other farm inputs. Ownership of a radio enables farmers to access information concerning their important economic and social activities, and this helps them to improve their livelihoods.

House value owned by members and non-members of AMCOS was the last asset value assessed. The average house value was Tsh 5 384 167 and Tsh 2 620 500 for members and non-members of AMCOS respectively. The difference was statistically significantly ($p \leq 0.05$) different, implying that members of AMCOS owned houses of higher value than did the non-members.

3.2 Food accessibility among members and non-members of AMCOS

Apart from food production and food expenditure, food accessibility was another variable studied. Table 2 indicates food access of members and non-members of AMCOS. Many of the members of AMCOS disagreed with the statements that their households may not have adequate food accessibility; the remaining percentage of members agreed and others said sometimes. Less than 50% of non-members of AMCOS disagreed with the statement that their households might not have enough food, while majority agreed and a few said "sometimes." The difference of those who indicated disagreement

Table 2. Difference in food accessibility between members and non-members (2017/2018 crop season)

Statement questioned on food accessibility to farmers	Response	Members %	Non-members %
Do you worry that your household may not have enough food?	Yes	18.5	31.0
	No	66.1	45.0
	Sometime	15.1	23.8
(Chi-Square=15.3, DF=2, P=0.00) *			
Have any of your household members failed to eat the kinds of foods they prefer because of inadequate resources?	Yes	20.1	33.8
	No	64.0	33.8
	Sometime	15.9	32.5
(Chi-Square=31.1, DF=2, P=0.00) *			
Have you or any of your household members limited the variety of foods eaten because of lack of resources?	Yes	15.3	23.8
	No	71.4	49.9
	Sometime	14.3	26.5
(Chi-Square=16.92, DF=2, P=0.00) *			
Have you or any of your household member eaten food that you preferred not to eat it because of inadequate of resources to obtain the preferred food?	Yes	18.0	26.5
	No	64.0	48.3
	Sometime	18.0	21.2
(Chi-Square=8.44, DF=2, P=0.015) **			
Have you or any of your household members eaten a smaller meal than you felt required/ needed because there was no adequate food?	Yes	14.8	23.8
	No	68.3	49.0
	Sometime	16.9	27.2
(Chi-Square=12.92, DF=2, P=0.002) *			

**= significant at p ≤ 0.01 and **=significant at p ≤ 0.01*

that they might not have sufficient food in their households between members and non-members of AMCOS was statistically significantly different ($p \leq 0.05$). The findings imply members of AMCOS accessed enough food compared to non-members. During the focus group discussion with farmers, both members and non-members in the study area reported to have been facing food shortages that made them fail to meet food demands throughout the year. This is especially the case during planting to harvesting period when there are food shortages as most of the food is sold to incur expenses of land preparation and purchase of farm inputs. However, the situation was worse for non-members than for members of AMCOS who got assistance from their organizations in purchasing farm inputs.

In addition, non-members reported to have kept their produce in warehouses for warehouse receipt in order to access loans and farm inputs. This was different for members of AMCOS who accessed loans easily since they were guaranteed by their AMCOS. They also easily accessed farm inputs through their AMCOS on agreement to pay the loan after crop harvest.

3.3 Contribution of AMCOS to members' livelihood outcomes

In determining the contribution of AMCOS to member's livelihoods outcome, propensity score matching (PSM) was computed. The PSM test has two steps: one probit regression model is computed to determine the likelihood of farmers to join AMCOS, and second step PSM is computed through STATA software to determine the effect of AMCOS to members in relation to livelihoods outcome.

Table 3 shows the results of the probit regression. Goodness of fit tests reveals that the selected observable covariates provide good estimates of the conditional AMCOS membership density. The joint statistical significance of the explanatory variables (LR Chi^2 test statistics) is 173.73 (p-0.000). The pseudo R^2 is reasonably good (0.3719) indicating a good fit of the model. According to Freese and Scott Long (2006), the pseudo R^2 ranging from 0 to 1 indicates better model fit.

Results (Table 3) show that the probability of becoming a member of AMCOS is significantly and positively influenced by the household-heads' age ($p \leq 0.005$). The possible explanation could be, as the farmer advances in age, he/she tends to be in a better position to experience and observe the benefits of membership in a group. Farmers who were older increased their likelihoods of joining the AMCOS than those who were young farmers. Young farmers tended to opt for other opportunities than practising farming as they preferred to migrate to town where they find non-farming occupations

Table 3. Probit estimation of determinants of co-operative membership

Factors for Membership	Coef.	Std. Err.	z	P>z
Age	0.0263945	0.0255478	1.03	0.032**
Sex	0.0862313	0.3140905	0.27	0.784
Marital status	-0.191201	0.4196547	-0.46	0.649
Education	0.0505212	0.02662	1.9	0.048**
Household size	-0.098337	0.0617472	-1.59	0.111
Farm size	0.0628058	0.0402107	1.56	0.118
Farm size cultivated	0.0455812	0.0628997	0.72	0.469
Farming experience	-0.408875	0.3336716	-1.23	0.22
Distance to AMCOS	0.1711858	0.3724555	0.46	0.646
Crop price information	0.982252	0.3283818	2.99	0.003*
Extension services	-0.417969	0.5398606	-0.77	0.439
Credit access	1.117853	0.6769311	1.65	0.009*
Amount credit accessed	3.26E-06	1.06E-06	3.07	0.002*
Access to farm inputs	0.3937757	0.1820955	2.16	0.031**
Income from agriculture	-2.19E-08	2.49E-08	-0.88	0.377
Cons	-1.071074	1.414665	-0.76	0.449

*Number of obs = 340, LR chi2 (15) = 173.73, Prob> chi2 = 0.0000, Log likelihood = -146.677, Pseudo R^2 = 0.3719, *= significant at p ≤ 0.01 and ** significant at p ≤ 0.05.*

leaving the old people in farming. The finding is similar to the findings in a study by Abebaw and Haile (2013) in Ethiopia. However, in other studies, age was found to have a negative influence on collective membership (Ito *et al.,* 2012).

Education level attained by household head was another variable which was positively and significantly associated with AMCOS membership (p ≤ 0.005). The results are similar with those in a study by Tesha (2010) in Mtwara Tanzania, which showed that the level of education attained by the household head had significant influence on his/her participation in AMCOS.

Other variables that were positively and significantly associated with AMCOS membership were information on crop prices and access to farm inputs (p ≤ 0.005). A possible explanation is that farmers are interested in knowing the prices of crops before selling them and accessing farm inputs. By providing such services, AMCOS increased the likelihood of farmers joining co-operatives. Lastly, credit access and the amount of credit accessed by farmers were positively significant in influencing farmers to join AMCOS (p ≤ 0.005). The possible reason for that was that farmers did need credit to facilitate their farming operations. Therefore, by providing credit to farmers, AMCOS attracted more farmers to join it.

Agricultural marketing co-operative societies are expected to contribute to the livelihoods of members who are service users. Such contribution is anticipated to impact on the decisions of farmers on membership in co-operatives. Livelihood contribution by AMCOS to members who are users of services can be determined using different indicators which include household income, assets values, equitable market, and other trickledown impact to local people (Enelow, 2012). This study focused on farmers' income, household assets accumulation, and food security (food expenditure, rice, and maize grown for consumption). For an indicator of food security, 'Households' income and expenditures surveys' method was used. According to Perez-Escamilla and Segall-Corrêa (2008), the method focuses on quantity of food bought (expenditure), the quantity of food to be given out or collected by household members as a gift or payment in kind and the food grown and harvested for use by household members. The variables were selected as indicators determining the contribution of AMCOS service used by farmers.

Table 4 shows the values of average treatment effect (ATT) for the different livelihood impact indicators using four propensity score-matching

estimators. As Baser (2006) notes, none of the proposed propensity score matching methods in the literature is superior to the other. Therefore, there is no reason of choosing one over the other. The ATT is determined by matching of the treated and comparison of farmers based on their propensity scores. The matching process of the study used two methods of the Nearest Neighbour Matching (NNM) and Radius Matching (RM). Nearest neighbour matching method involved matching a random draw by comparing near farmers who are members of AMCOS with farmers who are non-members with closest propensity score possible to the treated group. In the radius matching, the matching is done to the farmers in the radius who are members and non-members of AMCOS; the calliper was imposed to be 0.1.

The benefits of being member of co-operative can be indicated through increased income among members. Each member of AMCOS was matched with a non-member with like propensity score value to determine the average treatment effect for the treated (ATT). Table 4 shows that the difference of income from agriculture after matching between members and non-members was Tsh 2 881 379.41/= and Tsh 2 048 418.6/=, which were matched by the nearest neighbour matching (NNM) and radius matching (RM) methods respectively. The difference was statistically significant in both methods as t-value > 2.00. All the matching methods, which were employed, computed the T-score, indicated positive signs and the results were statistically significant, implying that membership in AMCOS significantly influenced members' income. The use of AMCOS services positively influenced the income obtained by farmers through sales of crop produce. The study results are similar with those in a study by Anullo and Getnet (2012) in Ethiopia, which showed that agricultural co-operatives' services positively influenced the income generated through crop sales by farmers. However, the study results are in contrast with the results of studies by Hun *et al.* (2018), Lawal-Adebowale *et al.* (2012) and Hoken and Su (2015) in Cambodia, Nigeria, and China, which revealed that there was no difference in the total income between members and non-members of agricultural co-operatives. The possible difference in the findings is due to the fact that agricultural co-operatives in the study area have managed to reduce transaction and production costs for members and this led to an increase of income. This is unlike other areas where agricultural co-operatives have failed to reduce transaction and production costs due small capital and capability of agricultural co-operative management.

The results obtained under the two matching techniques for value of assets showed positive

Table 4. Estimation of treatment effect on the treated using propensity score matching model of members and non-members of AMCOS

Variables	Sample	Members	Non-members	Difference	S.E	T-stat
Assets value In Tshs.	Unmatched	6708438.2	2979347.62	3729090.55	898551.03	4.15
	ATT by NNM	601217	3130794.12	2881379.41	1058497.9	2.72*
	ATT by RM	4066279.1	2017860.47	2048418.6	717347.45	2.86*
Income from Agriculture produce in Tsh	Unmatched	5117474.6	3507913.91	1609560.7	818280.04	2.17
	ATT NNM	4696637.8	2254325.58	2442312.21	1296532.6	2.28*
	ATT by RM	4718909.1	3119090.91	1599818.18	2241443.0	2.11*
Annual food expenditure in Tshs.	Unmatched	1178771.4	1105040.26	73731.1637	118009.63	0.62
	ATT by NNM	1120301.2	1435610.93	-315309.76	333382.83	-0.95
	ATT RM	1362272.8	1214181.82	148090.909	281425.42	0.53
Rice consumed in Kg.	Unmatched	676.28125	671.666667	4.61458333	70.373210	0.07
	ATT by NNM	649.68534	944.055944	-294.37062	202.85716	-1.45
	ATT by RM	855.55556	688.888889	166.666667	171.41901	0.97
Maize consumed in Kg.	Unmatched	659.57627	650.569892	9.00637871	86.499650	0.10
	ATT by NNM	650.73395	502.834862	147.899083	244.75815	0.60
	ATT by RM	729.62963	559.259259	170.37037	186.05777	0.92

**Statistically significance at T> 2.00*

influence on the use of co-operatives services on assets accumulation. The assets which were involved in this study included land owned, bicycles, motor cycles, knapsack sprayers, motorized sprayers, radios, televisions, cars, tractors, livestock, and house ownership. Respondents were thus required to estimate the cross-selling value of their assets at the time of the survey to calculate the current price value of their assets. The values of the assets were then summed up and the mean values matched using propensity score. The matching of score value of members and non-members of AMCOS to estimate the ATT generated the average difference from both marching methods. As shown in Table 4, the mean current price value of household assets owned by the treatment group (members of AMCOS) was higher than the current price value of household assets belonging to the control group (non-member) with the mean difference of Tshs 2 881 379.41/= and Tshs 2 048 418.6/= by NNM and RM respectively. To check whether the average value difference is significant, a two-sample t-test was employed and the difference was found to be significant in both methods as t-value > 2.00. This implies that membership in agricultural co-operatives influenced assets accumulation of members in the area of the study. The finding is similar to Wassie's *et al.* (2019) in Ethiopia, which showed that members of agricultural co-operatives owned assets with higher value than non-members did, and especially the land. In addition, the study findings are similar with the study by Shiferaw's *et al.* (2009) done in East Kenya, which showed that farmers involved in collective marketing of crops increased their assets. Increment of assets was associated with income diversification, which was obtained from agricultural produce covered by agricultural co-operatives. Thus, this increases the likelihood to save and invest through the purchase of assets.

Food security was the last variable to be measured in terms of influencing farmers to become members of agricultural co-operatives. Measurement indicator of food security was based on household income and expenditure survey method indicators, such as annual food expenditure and food crops (rice and maize) grown for consumption. Rice and maize were included in the measurement as the local people reported them as the main food crops in the area. The results of propensity score matching in Table 4 show that before matching, the average difference of food expenditure of members and non-members were TShs 118 009.637/= and TShs 333 382.83 and TShs 281 425.422 after the matching by NNM and RM respectively. However, differences before and after matching were not significant. Also, food grown for consumption (rice and maize) before matching and after matching did not show any significant difference on their average. These results suggest that membership in agricultural co-operatives has no influence on food security as there was no significant difference between members and non-members with and without the matching process. This may be because the agricultural co-operatives in the study area did not cover food crops such as maize and rice. Also, food crops (maize and rice) did not face marketing challenges as the customer is usually available locally unlike other crops such as cane and cocoa which are bought for industrial processing and both members and non-members of co-operatives grow food crops alongside cash crops. The findings are similar to those by Afolami *et al.* (2012) in Nigeria, which revealed that there was no significant variation in food crop harvests between members and non-members of co-operatives dealing with agricultural in Nigeria.

3.4. Major constraints to AMCOS in attaining sustainable livelihoods of members

During FGDs co-operatives members identified major constraints in agricultural output marketing, including price negotiation. In Mvomero District, farmers who were members of AMCOS complained of receiving low payment per ton of cane compared to their fellow farmers in Kilombero District even though both groups of farmers were producing the same crop, but selling to different factories, that is, Mtibwa Sugar Factory and Kilombero Sugar Factory. In addition, their counterpart farmers in Kilombero District were disappointed on the way sucrose content (sugarcane sweetness) was measured. They further said that to confirm whether the factory staff were cheating, when the same farm harvest was recorded for different owner, the sucrose content displayed was different and sometimes with a big variation. Therefore, all members of AMCOS in both districts said that their AMCOS were not adequately dealing with the issue of pricing; hence, lowering incomes that would in the end compromise sustainability of their livelihoods. A study by Mmari (2014) found that factory owners determined the price of farmers' produce and the sugarcane out-growers' representatives and AMCOS had little

say over sugarcane prices and weighing at the factory.

Also, during FGDs with farmers in both districts, members of AMCOS showed their disappointment ith harvesting arrangement coordinated by AMCOS. Farmers indicated that sometimes there were delays in harvesting farmers' sugarcane, which reduced sucrose content, and caused losses or low pay. Lastly, members of AMCOS reported poor timing of supplying farming inputs (fertilizers and pesticides). These were sometimes supplied when they were not required due to poor timing of the planting season. This led to paying for something that was not used during production. These findings are similar to the results in a study by Ojiagu and Onugu (2015) in Nigeria, which found that agricultural co-operatives are facing the challenge of providing effective service support to members, and this compromised sustainability of members' livelihoods.

During interviews with key informants (co-operatives managers), they (managers) complained about the action of the government officials (co-operatives officers) directly supervising the co-operatives matters despite the autonomy which AMCOS ought to enjoy. Such a trend limits AMCOS powers of making decisions and taking innovative measures in attaining sustainability of members' livelihoods. In addition, co-operatives managers cited the challenges they encountered in dealing with co-operatives board members who oversaw the overall co-operatives business. One of co-operatives managers in Kilombero District said that, in some cases, the chairperson of the board performed duties of the manager, a habit which was considered incorrect since the chairperson was not a regular worker of the co-operatives. In addition, members of co-operatives governing board were elected not because of their skills and knowledge but because of their influence. As a result, they failed to lead and oversee the matters of the co-operatives in any professional way. This posed the problem of conflict of interest in managing AMCOS and poor performance of co-operatives. The results are similar to the findings by Effiom's (2014) study done in Nigeria, which showed that co-operatives demonstrated poor management styles. This is because members are elected into the management committees, not based on their managerial expertise and experience, but on their popularity, hence, they perform their duties poorly.

lso, during in-depth interview with the District Co-operatives Officers in both districts, the researcher posed the issue of many co-operatives not being managed by professional managers which made them to fail to meet members' needs. A District Co-operative Officer in Kilombero District had this to say:

As you continue with collecting data just ask the managers about their qualifications. Most of them are not qualified as they are form four leavers employed on nepotism basis which results in poor performance in managing the co-operatives. As a government employee responsible for co-operatives, we are supposed to intervene when something is wrong. However, if we leave those AMCOS to managers they will cause chaos to members as they tend to mismanage funds of the organization they lead. Kilombero (Ifakara) - 27/10/2022.

The complaint about the unqualified managers was raised by the District Co-operative Officer and was confirmed by research findings as out of the six AMCOS managers, only two were university graduates, two were Form four and two Form six leavers. Worse still, none of the two university graduates had even received specialized training in co-operatives management; hence, leaving a leadership vacuum in the co-operatives management that requires adherence to principles and core values. Nganji (2014) in Kenya, showed that education level and training influenced the leaders' performance in co-operatives societies. Training of leaders is essential in improving leaders' capacity when leading organization; but inadequate training and skill development leads to poor performance.

4. CONCLUSIONS

Based on the empirical results of this study, it is concluded that AMCOS members and non-members have different livelihood outcomes. The propensity score-matching methodology verified that AMCOS members had contributed to their members' income and assets (measured in monetary value). It was established that AMCOS had not made a major impact to the outcome of food security, despite the recorded contribution of AMCOS to some livelihood's outcomes. According to the survey, AMCOS executives should enhance their service delivery model to better satisfy their members. In order to prevent membership deprivation and the loss of the co-operatives' autonomy, District Co-operative Officers should supervise AMCOS in accordance with the co-operatives' principles

and values. The report also suggests that co-operative managers receive on-the-job training to help them develop the knowledge and skills necessary to better manage AMCOS.

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