Determinants of Participation in Associative Dynamics by Farmers in the Highland Zone of the Baswagha Chiefdom in Eastern DRC

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Abstract

The grouping of villagers into agricultural associations helps promote peasant agriculture. Exposed to many pressures, village organizations allow members to face the challenges surrounding their farms. Through their role of social inclusion, they also contribute to the socio-economic development of the area. In the face of this evidence, the study seeks to identify the drivers of the associative dynamics of farmers in the highland zone of the Baswagha Chiefdom in eastern DR Congo. Adopting a positivist posture on both 409 and 193 farmers, the results of the regressions indicate that the farmer's group of origin, marital status, savings, access to credit, income, soil type, source of environmental information, level of education, certain main activities carried out, certain sources of fertilizer In the conclusion, the contributions of the farmers to the project, their knowledge of the environment, and their knowledge of the local community, were all considered to
be important factors in the development of the project. In the conclusion, the contributions, limitations, and implications of the study are detailed.

Keywords: Adhesion, agriculture, peasants, active participation, Baswagha chiefdom

1. Introduction

On a global scale, participation in associative dynamics is among the key tools for improving farmers' living conditions[1], [2]. In DR Congo, it is thanks to the popular imagination that organizations such as NGOs, mutual aid associations, and various associations are born[3], [4] that are taking over from state services in defending[3], [5] and promoting the interests of agricultural producers[4], [5] the structuring of the peasant world[6], [7] and good governance within member organizations[8], [9].

Like all the chiefdoms in Lubero Territory, more than 95% of the population of Baswagha chiefdom is involved in agriculture[10] spread over the highland area of this study and the lowland area. Overall, the high population density is located in the highland zone above 2,000 meters in altitude[11], [12]. The highland zone is considered the agricultural breadbasket of Lubero Territory because it plays a very important role in the production of cereals, oilseeds, tubers, vegetables, and other foodstuffs most consumed in the Territory[12], [13]. Nevertheless, this production does not meet the food needs of the local population[14] because field surveys of farmers' households indicate that the proportion of inhabitants living on less than $1 per day is 38%[13]. The population in Lubero Territory is growing over time. Statistics inform that between 1996 and 2015, the population increased by 388519 inhabitants or 42.6%[15]. Considering only the years between 2013 and 2017, a significant decline in agricultural production of -96.4% accompanied by a population growth rate of 17.9% has led to small farms[14] and food insecurity[13], [16], while this territory also feeds the surrounding towns such as Beni and Butembo. Added to this are land conflicts, political insecurity, climate change that has diverted farmers from their agricultural calendar, etc.

Recognizing the importance of farmer organizations in the local development process, some rural leaders are creating farmer organizations intending to improve the living conditions of farmers[4], [17]. Nevertheless, there is little commitment to farmer organizations among Congolese farmers in general[9], [18]–[20] and those in the hills area of the Baswagha chiefdom in particular[17]. It is important to question the main determinants of participation in associative dynamics.

In the past, several empirical studies have investigated the factors influencing participation in Farmer Organizations and the findings are divergent: for some researchers, participation in Farmer Organizations is influenced by socio-demographic and economic characteristics (in Nigeria[21], in Tanzania[22], in Ghana[23], in Benin[24], in Bangladesh[25]); for others, asset endowment and institutional setting (in China[26], in Cameroon[27] and Iran[28]) and environmental characteristics (in DRC[18], in South Africa[29], in Indonesia[30])
influence membership in the farmers' movement. Although they found good results, they analyzed the issue of dynamism from a single perspective, membership in a farmers' organization, forgetting the frequency of participation in meetings and multiple memberships.

The contribution of this study is threefold. First, to our knowledge, it is the first empirical analysis that takes into account membership, active participation, and multiple memberships. On the one hand, from a global approach, it aims to identify the factors (socio-demographic, economic, institutional, natural, and environmental) that determine the probability of being part of farmers' organizations or not (membership). From this perspective, the study targets established farmers. On the other hand, it aims to identify the variables that justify associative activism (frequency of participation in meetings) and multiple memberships. In this case, only farmers belonging to village associations are concerned. Secondly, this study reveals certain variables (consultation with a member before joining, proximity to a school) that, to our knowledge, have never been identified in empirical studies as determinants of farmers' multiple memberships in farmers' organizations. Finally, this study focuses on an area that has never been analyzed and a country that has been very little analyzed in research on the determinants of participation in associative dynamics.

This work has three objectives: First, to take stock (descriptive statistics) of the associative movement in the Baswagha Chiefdom and understand the motives (advantages, difficulties) of this dynamism. Second, to determine the variables that justify membership in the associative dynamics in the Baswagha chiefdom. In addition to the above, identify the factors that justify the active participation and multiple memberships of established farmers.

This study is divided into three sections. The first section discusses the literature review. The second section focuses on the chosen research methodology. The third section presents analyzes and interprets the results of the survey. The study also presents the conclusion, the limitations, and managerial implications and proposes perspectives for future studies.

**Review of the Literature**

In recent years, the dynamics of associations have undoubtedly received renewed attention from social science researchers and the results of empirical studies reveal that associative commitment is a selective activity. In the agricultural sector, four factors are most cited.

First, previous studies confirm that socio-demographic characteristics[31], [32] influence participation in associational dynamics. Thus, age[21], [29], [33], gender[34]–[37], marital status[31], [38], education level[39]–[42], household size[41], [43]–[45], the presence of children under six years of age[46], [47], The number of people attending school in a household[48]–[51], land ownership[29], [44], [52], seniority in a setting[46], [53], [54] and religious practice[55]–[59]; place of origin[45], [60], [61] are accompanied by a propensity for rural residents to participate in associative dynamics. The fact that a farmer is in contact with a
member of a peasant organization can be considered as a proxy for access to the extension service[43], [61]–[63] which is why we believe that this variable improves the decision to participate in associative dynamics.

Second, research findings support that economic factors[36], [42], [64], impact participation in associative dynamics among others the practice of agriculture as a main activity[65], [66], the practice of a secondary activity[36], [42], [67]; the size of the farm[39], [41], [61], [65], the ownership of livestock[45], [68], [69], Savings Practice[70], [71], Access to Credit[31], [49], [72]–[75], household income[31], [43], [45], [70], [76], [77] the main source of funding for the organization[20], the requirement of regular membership dues and membership fees[78], [79] exert an influence on farmers' membership in farmers' organizations.

In addition, institutional factors[22], [36], [37], [39] influence participation in associative dynamics. For example, the closest distance to an agricultural association[20], [78], a school[80], [81], a health institution[82], [83] and a market[22], [36], [37], [39], [62], [70] would positively influence a farmer's membership in a farmer organization.

Finally, environmental and natural factors[29], [84] such as the source of input supply[80], [85], soil quality[18], [84], [86]; the more productive season[87], the source of environmental information[18], [88] influence participation in associative dynamics. The table below provides an overview of the different measures of the exogenous variables and their expected signs on both the "membership" and "multi membership" variables.

### 2. Materials and Methods

#### 2.1. Study population and sample

The study population is made up of heads of households, farmers, members, and non-members of peasant organizations in the highlands of the Baswagha chiefdom in Lubero Territory, North Kivu Province, Democratic Republic of Congo.

The Baswagha chiefdom has nine groups that cover 98 localities and are divided into two zones: the high-altitude zone or highland zone and the low-altitude zone or lowland zone. This study covers all of the highland zone located in twenty-three localities and distributed in five clusters: Bukenye, Bulengya, Buyora, Luongo and Ngulo.

Two reasons justify the choice of this zone: First, it is the main source of production of cereals, oilseeds, tubers and vegetables, and other food products that are most consumed. Second, unlike the lowland zone, this area is more secure and almost all households practice agriculture as their main activity.

The sample size was obtained by using the following formula: \[ n \geq \frac{Z^2 \cdot \pi \cdot (1 - \pi)}{m^2} \] [89].

Where \( n \) is the sample size,
\( Z \): The confidence level according to the reduced centered normal distribution (\( Z = 1.96 \) for 95%).
The estimated proportion of the population that participates in the farmers' organizations. In the Congolese context, empirical studies[18] show that the membership rate of farmers in associations is 46%. m: the margin of error. In this study, the accepted margin of error is 5%.

Applying the formula based on these elements together, the sample size is 384 farmers. To guard against the efficiency risks inherent in cluster sampling, we added a 7% rate to this sample. Thus, a sample size of 409 respondents in the different geographic areas was retained.

Due to the lack of a list of population units, cluster sampling was preferred. To allow for heterogeneity of units, and therefore a large variety of data, we favored a large number of small clusters instead of a small number of large clusters. For this purpose, the 23 localities (and hence the sub-localities) were formed into groups.

Since the population size is not known within clusters and clusters do not have the same population, the number of respondents in each village was based on the availability of farmers and the observed population density. This criterion resulted in the number of respondents varying between 16 and 20 in the villages involved in this study. Through a randomized procedure, farmers were contacted up to the required number in each village.

2.2 Data collection

Data were collected in two stages: the pre-survey and the quantitative survey. The purpose of the pre-survey was to pre-test the questionnaire. This stage allowed for the rewording, deletion, and addition of certain questions. To minimize the bias related to the understanding of the different questions, some parts of the questionnaire were translated into the local language and the interviewers were trained and conducted a second pre-survey to be reassured of the mastery of the questionnaire before the actual survey. The data was collected using the KoBoCollect application and entered into a database in EXCEL; a prelude to subsequent statistical processing (SPSS and STATA).

2.3 Measurement of variables

The analysis of the associative dynamics was done under a triple dimension: membership, active participation, and multi-membership. They provide information on the probability of belonging to farmers' organizations as well as active and numerical participation in farmers' organizations. For this purpose, the first dimension concerns all farmers. The other two dimensions concern only members of farmers' associations. Bivariate statistics (t-test, chi-square, F) were performed on the three dimensions. However, only the dimensions "membership and multiple membership" were regressed. These two variables were regressed on 31 exogenous variables. The first dimension was affected by 27 independent variables, while four other variables (Consult, Sourcefin, Cotise, and AprMontadh) were introduced into the model relating to multi memberships.
Table 1. Measurement of independent variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Meaning</th>
<th>Measure</th>
<th>Expected result</th>
</tr>
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<tbody>
<tr>
<td><strong>Socio-demographic factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agechf</td>
<td>The head of household's age</td>
<td>Number of years completed</td>
<td>+</td>
</tr>
<tr>
<td>Sexechf</td>
<td>Household head gender</td>
<td>1 Masculin et 0 si feminin</td>
<td>+</td>
</tr>
<tr>
<td>Etciv</td>
<td>Marital status</td>
<td>1 = Married, 2 = Single, 3 = Widow, 4 = Divorced/Separated.</td>
<td>+</td>
</tr>
<tr>
<td>Nivetchef</td>
<td>Level of education of the head of the household</td>
<td>The number of years of study completed.</td>
<td>+</td>
</tr>
<tr>
<td>Tailmen</td>
<td>Household size</td>
<td>Number of people in the household</td>
<td>+</td>
</tr>
<tr>
<td>Nbenf6m6an s</td>
<td>Number of children under 6 years old</td>
<td>Number of children under 6 years of age in the household</td>
<td>-</td>
</tr>
<tr>
<td>Nbpescol</td>
<td>Number of people in school</td>
<td>Number of persons attending school in the household</td>
<td>+</td>
</tr>
<tr>
<td>Old</td>
<td>Seniority in the village</td>
<td>Number of years in the village</td>
<td>+</td>
</tr>
<tr>
<td>Statocpa</td>
<td>Field occupancy status</td>
<td>1 = tenant, 0= owner</td>
<td>-</td>
</tr>
<tr>
<td>Gouporgn</td>
<td>Grouping of membership</td>
<td>1= Bukenye, 2= Bukengya, 3= Buyora, 4= Luongo, 5= Ngulo</td>
<td>+</td>
</tr>
<tr>
<td>Consult</td>
<td>Consultation in the decision</td>
<td>1= Yes, 0= No</td>
<td>+</td>
</tr>
<tr>
<td>Religion</td>
<td>Religious practice</td>
<td>1=Catholic; 2=Revival; 3=Protestant; 4=Adventist; 5=Kimbanguist</td>
<td>+</td>
</tr>
<tr>
<td><strong>Economic factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actprinc</td>
<td>Main activity</td>
<td>1= Agriculture, 2= Livestock, 3= Salaried</td>
<td>+</td>
</tr>
<tr>
<td>ActSecond</td>
<td>Ownership of a secondary activity</td>
<td>1= Commerce, 2= Agriculture, 3= Livestock, 4= Handicraft, 5= Salaried</td>
<td>+</td>
</tr>
<tr>
<td>NbreChamp</td>
<td>Number of fields</td>
<td>Number of cultivated fields</td>
<td>+</td>
</tr>
<tr>
<td>IndBetain</td>
<td>Possession of livestock</td>
<td>Number of animals owned. The variable was summed and then reduced to an index</td>
<td>+</td>
</tr>
<tr>
<td>Savings</td>
<td>Building up savings</td>
<td>1 if yes and 0 otherwise</td>
<td>+</td>
</tr>
<tr>
<td>Revenu</td>
<td>Farmer's income</td>
<td>Monthly income in dollars</td>
<td>+</td>
</tr>
<tr>
<td>Credit</td>
<td>Access to credit</td>
<td>1 if yes and 0 otherwise</td>
<td>+</td>
</tr>
<tr>
<td>Sourcefin</td>
<td>Source of funding for the operation of the association</td>
<td>1= funding, 2= contribution, 3= both forms</td>
<td></td>
</tr>
<tr>
<td>Cotise</td>
<td>Requirement for regular contributions</td>
<td>Number of associations that require regular dues</td>
<td>-</td>
</tr>
<tr>
<td>AprMontad h</td>
<td>Appreciation of the cost of membership</td>
<td>1= Very expensive, 2= expensive, 3= less expensive, 4 = very less expensive</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 1 (continued). Measurement of independent variables

<table>
<thead>
<tr>
<th>Institutional factors</th>
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</thead>
<tbody>
<tr>
<td>ProxImf</td>
<td>Financial Institution</td>
<td>Log minutes</td>
</tr>
<tr>
<td>ProxAss</td>
<td>Proximity Association</td>
<td>Log minutes</td>
</tr>
<tr>
<td>ProxHop</td>
<td>Proximity Health Institution</td>
<td>Log minutes</td>
</tr>
<tr>
<td>ProxMar</td>
<td>Proximity Market</td>
<td>Log minutes</td>
</tr>
<tr>
<td>ProxEcl</td>
<td>Proximity School</td>
<td>Log minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Natural and environmental factors</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prisoufer</td>
<td>Main source of fertilizer</td>
<td>1 = Associative organization; 2= Livestock, 3= Other (State, fields, crops, etc), 4= Without</td>
</tr>
<tr>
<td>Tysol</td>
<td>Type of soil</td>
<td>1= Sandy soil, 0= Clay soil</td>
</tr>
<tr>
<td>Saisop</td>
<td>More productive season</td>
<td>1= High season, 0= Low season</td>
</tr>
<tr>
<td>Sourinfenv</td>
<td>Source of environmental information</td>
<td>1= farmers' organizations; 0= other sources</td>
</tr>
</tbody>
</table>

2.3.1. Dependent variable: membership, active participation, multiple memberships
Membership in farmers' organizations is a binary variable. It takes the value of 1 when the individual belongs to an associative dynamic and the value of 0 in the opposite case. This variable seeks to explain the probability of membership in farmers' associations. Active participation is an ordinal variable that provides information on the frequency of participation in farmers' organizations. It takes the values (1) Never, (2) Rarely, (3) Often, (4) Always. Multi-membership is a quantitative variable. It provides information on the number of village associations to which a farmer belongs.

2.3.2. Independent variables
The independent variables used in this work are of four kinds: socio-demographic factors of the farmer, economic factors, institutional factors and environmental factors.

2.4. Data analysis and processing tools
The data for this study were processed in the STATA 14 software and statistical and econometric analysis were used. The statistical analysis was essential in the univariate and bi-variate analysis. The econometric analysis made it possible to identify the variables that are important in explaining participation in the associative dynamics in the Highlands zone of the Baswagha Chiefdom. Logistic and linear regression were used according to the nature of the variables of interest. On this basis, the model is as follows:
With \( P(Y_j = 1/X_j) \) the probability of joining farmers' organizations; 
\( X_j \ldots X_n \): Explanatory factors of the decision to participate in associative dynamics including socio-demographic, economic, institutional, and environmental factors; \( \alpha_j \) et \( \beta_j \): Parameters to be estimated; \( \varepsilon_j \): Error term.

To assess the impact of the explanatory variables on the probability of membership, marginal effects were calculated. These refer to the observed variations in the probability of membership resulting from a unit variation of a quantitative explanatory variable (or change from 0 to 1 of a binary variable) when all other explanatory variables are maintained at their averages.

\[
\text{EM}(X_i) = \frac{d}{dX_i} = \frac{e^{\alpha_i + \sum_{j=1}^{n} \beta_j X_j}}{1 + e^{\alpha_i + \sum_{j=1}^{n} \beta_j X_j}} \quad (2)
\]

We finally used Microsoft office word is writing and Zotero referencing this research.

Where EM denotes the marginal effects of the variable Xi. The significance of each variable was checked using the Wald test. To test the validity of the model (the goodness of fit of the model), the Hosmer and Lemeshow test was used. Finally, to test the strength of association of the models, the McFadden R-two was used, which is equivalent to the coefficient of determination (R2) obtained in classical regression. However, as this statistic is less rigorous in logistic regression, the model specification was used to see the percentage of better-ranked data. The individual test was made possible thanks to the Fisher's Z or Student's t associated with each coefficient. On the other hand, linear regression was used to determine the causal relationship between the multiple memberships of farmers in the farmers' organizations and certain factors. From this perspective, the model is of the form:

\[
Y = \alpha_0 + \beta_i X_i + \varepsilon \quad (3)
\]

where Y represents the dependent variable (multiple memberships), Xi the independent variables (factors). The model was tested using direct effects. The overall quality of the model was judged by Fisher’s F while the goodness of fit was judged by the R2. The importance of each variable was directly related to its t-value as well as to its probability. For non-collinearity, the tolerance and VIF criteria were used[90].

2.5. Referencing

References throughout this study were applied with the Zotero tool.

III. Results

III.1. Descriptive statistics

The following information relates to the frequencies (means) of certain variables and statistical tests (chi-square, t-test, and Fisher) of socio-demographic and
Determinants of participation in associative dynamics by farmers

economic characteristics with certain variables of interest. To do this, four analyses were conducted.

First, without an associative focus, all variables were analyzed to help understand the nature of the subsequent results. These were frequencies for the categorical variables and means for the quantitative variables.

In terms of frequencies, the results indicate that, apart from land conflicts, all the other variables included in the category of difficulties are moderately valued by farmers. The analysis of all other variables in this category is not far from this reality. This suggests that the difficulties are moderate. However, difficulties related to land conflicts, plant diseases, and profitability stand out. The analysis shows that 78%, 78%, and 77% of farmers confirm that they face, in a pronounced way, plant diseases, land conflicts, and lack of profitability. While difficulties related to access to traditional seeds (39%) and political insecurity (39%) are underestimated, those related to insect pests (71%) and income (69%) also deserve special attention. In terms of benefits received, members claim at least 74% of gains from membership.

As expected, the majority of respondents are male (69%), Catholic (64%), with primary education (69%), married (87%), and from the Bukenye group (61%). Similarly, the average household size is 7 individuals, with an average age of 47 years, the average number of fields owned is 4, while 31 is the average number of years that people have lived in the area. These figures should be taken with caution given the standard deviations associated with them.

The results indicate that there is a dependency between pest and income problems, access to credit, savings formation, gender, marital status, education level, age of the farmer, number of fields owned, and membership in a farmers' association. Membership is one thing, but frequent participation in meetings is another. At this point, the results indicate a dependence of difficulties in accessing improved seeds, labor, and land conflicts on active participation in farmers' organizations. These results imply that the more actively a farmer participates in a farmer organization, the less he/she has to worry about accessing improved seeds, the more he/she can access farm labor (through information exchange), and the more he/she can resolve land conflicts. Much better, active participation is also linked to financial literacy, adaptation to climatic variations, and contact with administrative authorities. Like membership, gender and education level are also associated with active participation in farmers' organizations. Finally, group of origin and religious belief are also closely related to active participation. In this regard, can we say that Catholics and people from Bukenye are the ones who are numerous in the local village associations?

As for multi-membership, the results indicate a significant difference between multi-membership and difficulties related to soil quality, roads, and insecurity. These results imply that the variation in the number of associations one belongs to is partly justified by these elements. For example, a farmer may decide to join another organization because of the poor road conditions between him and the first organization of which he is a member. In the same way, the variation in multiple memberships, is not neutral to all the advantages received above, the group of origin, the farmer's gender, access to credit, the availability of savings, and, above
all, seniority in the village. The fact that the farmer has lived in the area for a long
time gives him a wealth of information so that he knows the advantages of joining
a farmers’ association, and can target the best organizations to belong to achieve his
objectives.

3.2. Regression

The results related to the quality of the models are satisfactory. On the one hand,
despite its relativism, the share of variation in membership that is driven by
explanatory variables is encouraging (Pseudo R² = 0.4338). More interestingly, the
results (Appendix) indicate that the model is correctly classified (82%).
Furthermore, the statistics (Wald chi²(42) = 143.22; p. 0.0000) indicate that at least
one of the exogenous variables explains the decision to join farmers’ organizations.
Indeed, the results confirm that certain characteristics related to the farmer's marital
status, level of education, main activity, source of fertilizer, savings, credit and
income, soil type, source of environmental information, and proximity to
associations are related to membership in Associative Dynamics.

On the other hand, the linear regression results indicate that the model is globally
significant (F=2.047; p.002). These results also show a good amount of variability
(R²=28.6%) and VIF coefficients within acceptable limits (VIF < 10). These results
indicate the absence of multicollinearity and prove that the model is well fitted.
Therefore, five variables significantly explain multiple memberships among
farmers in the Baswagha highland zone: a group of origin, consultation with a
member before joining, earned income, dues collection, and livestock ownership.
Taking into account stepwise regression, three other variables are added: seniority,
proximity to a school, and field tenure status.

Table 2. Logistic and linear regressions

<table>
<thead>
<tr>
<th>Variables</th>
<th>Membership</th>
<th>Multi-membership</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dydx</td>
<td>Std. Err</td>
</tr>
<tr>
<td>Gouporgn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ref.</td>
<td>(Bukenye)</td>
<td></td>
</tr>
<tr>
<td>2. Bulengya</td>
<td>-.0927149</td>
<td>.087792</td>
</tr>
<tr>
<td>3. Buyora</td>
<td>.0239398</td>
<td>.0575422</td>
</tr>
<tr>
<td>4. Luongo</td>
<td>.0325592</td>
<td>.0676842</td>
</tr>
<tr>
<td>5. Ngulo</td>
<td>.0062916</td>
<td>.0975334</td>
</tr>
<tr>
<td>Agechf</td>
<td>.0020532</td>
<td>.0021806</td>
</tr>
<tr>
<td>Sexechf</td>
<td>.047668</td>
<td>.0479028</td>
</tr>
<tr>
<td>Etciv (ref. Married)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Single</td>
<td>.294608</td>
<td>.0674329**</td>
</tr>
<tr>
<td>3. Widow</td>
<td>.087507</td>
<td>.1065024</td>
</tr>
<tr>
<td>4. Divorced</td>
<td>.2224549</td>
<td>.1043973**</td>
</tr>
<tr>
<td>Educ (ref. University level)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. High school</td>
<td>-.3424367</td>
<td>.1121616**</td>
</tr>
<tr>
<td>3. Primary</td>
<td>-.3426637</td>
<td>.1123671**</td>
</tr>
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</table>
### Determinants of participation in associative dynamics by farmers

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Tailmen</th>
<th>Nbenfm6</th>
<th>Nbrescol</th>
<th>Status of the field</th>
<th>Old</th>
<th>Religion (ref. Catholic)</th>
<th>Actprinc (ref. Agriculture)</th>
<th>ActSecond (ref. Trader)</th>
<th>IndBetail</th>
<th>NbreChamp</th>
<th>Savings</th>
<th>Credits</th>
<th>Revenue</th>
<th>Prisoafer (ref. OP)</th>
<th>Tysol</th>
<th>Saisop</th>
<th>Sourinfenv</th>
<th>ProxImf</th>
<th>ProxAss</th>
<th>ProxHop</th>
<th>ProxEcl</th>
<th>ProxMar</th>
<th>Consult</th>
<th>Sourcefin</th>
<th>Cotise</th>
<th>AprMontadh</th>
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N1: 409 and N2: 193 (*, **, ***): significance (10%, 5%, 1%).
Discussion

The results indicate that being single or widowed improves the probability of membership in village organizations by 29% and 22% respectively. These results are justified by the fact that in Lubero Territory, married respondents had a high responsibility to their families. These results were confirmed by many researches [35], [46], [91].

The level of education deteriorates the probability of membership in farmers' organizations by 34%, which is contrary to the expected sign. This result is justified by the fact that in Lubero Territory, as a result of the lack of intellectual cream the more educated a farmer is, the higher his chance of getting a gainful job. These results are similar to those obtained by some researchers [22] but also opposed by others [92]. Similarly, livestock as a primary activity decreases the probability of membership in village associations by 128%, results meeting the assorted findings of work conducted by former research [18], [64].

Saving improves the probability of membership in Farmer Organizations by almost 13%. These results are consistent with those obtained in former studies [70] and are justified by the fact that in the study setting, households that build savings can meet the financial demands of associational dynamics such as membership fees and dues. Access to credit also improves the probability of membership in farmers' organizations by 19%. Since the Baswagha Chiefdom upland area has almost no formal financial institutions, the credit discussed here is provided by informal lenders. The results of this research are consistent with former results by others researchers [18], [22], [61]. Compared to farmers whose main source of fertilizer is the village organization, a farmer's use of livestock deteriorates his or her probability of membership in farmer organizations by 33%. These results were confirmed by other researchers [93].

Farmers with sandy soil are predisposed to join farmer organizations. This soil quality increases the probability of membership by about 8%. This result is justified by the fact that the area under study is a market gardening zone where crops are more favorable on the clay soil. Farmers with sandy soils are more affected by low production, which is why they join farmers' organizations to receive training on methods for increasing crop yields. These results are consistent with those of other researchers [18], [84]. Using associations to have environmental information improves the probability of adherence by 39%. These results were confirmed by other researchers [43].

Finally, proximity to an Association improves the probability of membership by 32%, and proximity to a school is positively associated with multi-membership. These results were confirmed by former studies in Kenya [94] while others found no association between proximity to a school and an Association with associational participation [18], [73].

Regarding multi-membership, a grouping of origin leads to membership in more than one associational organization (0.096). Results similar to ours were obtained by others researchers [45], [60], [61], [64]. A farmer who does not own the field is likely to be a member of fewer village associations. Indeed, there is a negative
Determinants of participation in associative dynamics by farmers

significant relationship between field tenure status and multiple memberships (t= -1.66; p<1). The results of this study are similar to those obtained by other former studies[29], [44], [52].

Curiously, contrary to our original hypothesis, seniority in the setting (t= -2; p<10) negatively affects multi-membership in village organizations. This result was confirmed by others research in Ethiopia[95], [96]. For its part, there is a linear relationship between livestock ownership and multi-membership (t= 1.71; p< 10). These results are consistent with those obtained by other researchers[95]–[98].

The lower the income, the more multi-adherent one is (t= -2.27; p<5). These results were confirmed by former researchers [65], [70], [76]. On the other hand, other studies did not find the influence of income on participation in farmers' associations [34].

There is also a significant relationship between consulting a member of an organization and multi-membership (t= 1.88; p<10). These results were confirmed by former researchers in Zimbabwe[99] and Nigeria[100].

Finally, there is a statistically significant relationship between contributions paid and multi-membership (t= 3.37; p<5). Additional results provide insight into this relationship. Indeed, the descriptive statistics show that more than 75% of farmers who belong to farmers' associations state that at most one organization asks for membership fees. It stands to reason that when a farmer has in mind that these structures are not dedicated to holding members to ransom, he or she is motivated to belong more. These results are consistent with the findings of Ngalamulume's work[20], [82].

Conclusion

Throughout the world, agricultural development is provided by associative movements. Subject to several constraints, the united agricultural operators access certain advantages and master certain difficulties. It is within this framework that this study had two complementary objectives. On the one hand, to take stock of the associative dynamics of farmers in the highlands of the Baswagha Chiefdom. On the other hand, to identify the factors that justify membership or multiple memberships in farmers' associations. In favor of a quantitative methodology, it was useful to explore the concept upstream to better understand the issue under study in its "natural" environment. Thus, two matched samples were drawn to study the probability of membership in a farmers' organization and to analyze the motives for simultaneous membership. While all sampled farmers were covered by the first question, the second question targeted only members of farmers' organizations. Because of their complementarity, the information obtained provided a holistic view of the phenomenon under study.

The results indicate that farmers in the highland zone of the Baswagha chiefdom have a moderate level of membership in farmers' associations. Indeed, 47% of the farmers contacted are members of these structures. Factors that encourage farmers to join include the farmer's marital status, savings, credit, income, soil type, and source of environmental information. On the other hand, the farmer's level of
education, certain main activities performed, and certain sources of fertilizer origin. Similarly, group of origin, consultation with a member before joining, earned income, collection of dues, livestock index, seniority, proximity to a school, and resident status do or do not justify multiple memberships among farmers in the Baswagha Chiefdom highland zone. These results have undeniable theoretical and managerial implications. On the theoretical level, the study provides a detailed explanation of the factors that explain membership in village agricultural organizations. At the same time, the fact that most of these variables are statistically significant for multiple memberships suggests that the two concepts are complementary. From a managerial point of view, and like all action research, rural agricultural operators are equipped with the variables to be mobilized to belong to agricultural associations, and the efforts to be made to avoid falling into inertia and isolation. The public authorities, through the preliminary tests carried out, are becoming aware of the positive effects of agricultural cooperation. The advantages of membership and the difficulties that justify this membership are of concern to the government. Despite these achievements, some flaws deserve to be pointed out. It is universally accepted that dynamics is a variable that can be observed over time. Analyzing this variable from longitudinal data would allow for a better understanding of the phenomenon under study. Nevertheless, at the risk of falling into the error of telescoping and memorization, it was not easy for the farmers to give precise information about their associative past. Nothing is ever definitive, these few observations constitute openings within the reach of the intellectual cream that makes agricultural entrepreneurship and the associative movement their hobbyhorse.

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