



Assessing the factors underlying differences in achievements of farmer groups: methodological issues and empirical findings from the highlands of Central Kenya

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Abstract

This paper examines the performance of rural-based community groups in Central Kenya and addresses the methodological issues and challenges faced in doing this. Performance measures included subjective and objective ratings of success, including more objectively verifiable measures at household and group levels, derived from a survey of 87 groups and 442 households within four sites. Empirical evidence regarding explanatory factors for relative performance levels is presented using a special sample of 40 groups involved in tree nursery activities, with both descriptive analysis and regression models.

Collective action is desired and practised for many tasks. The incredible number, diversity and dynamic nature of groups make it difficult to standardise and measure achievement. Choice and level of performance measures matters in explaining differences in group achievement. Focusing on groups undertaking similar activities allows deeper analysis of performance drivers. Examining different types of groups engaged tree nurseries found that performance

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was not linked to any easy-to-measure group characteristic, implying that for this task dissemination need not be targeted towards particular types of groups.

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Keywords: Collective action; Natural resource management; Technology adoption; Strengthening groups; Kenya; Group performance

1. Introduction

Collective action is widely recognized as a positive force for rural development in Africa. Groups enable individuals to empower themselves and to increase benefits from market transactions. Getting together with others also can allow individuals to better cope with risk, particularly when neither the private sector nor the government provides any 'safety nets' or insurance against risk. 'Groups' are understood and measured for the purposes of this study as having some kind of formal arrangements, i.e., they had to have a name and a defined leadership. This study focused on distinct entities formed at the community level rather than groups belonging to more 'top down' federations or cooperatives such as Kenya's tea and coffee cooperatives. Literature that has documented the large number of local groups across Africa attests to their popularity among rural populations. It is hardly possible to find a development organization, research organization or governmental programme that does not attempt to work with community-based organizations in pursuance of rural development goals.

But are groups uniform in their ability to effectively produce achievements (i.e., performance) across different types of activities? Who benefits from group activities and which ones? Are there certain structural factors or characteristics of groups that contribute to or inhibit effective performance? How should group performance be measured? Given the keen competition for household and project resources, providing evidence on these and related questions can help in strengthening groups and in finding better ways for external organizations to support and collaborate with them. The study of how rural collective action performs is a growing but still relatively small research area. Thus, there are significant methodological hurdles as well as empirical gaps to overcome.

This paper, aims to contribute to both the methodological and empirical gaps in the literature related to the performance of groups. First, some of the key concepts in measuring and assessing group performance, some findings from the literature and issues that arose in participatory multiple-stakeholder workshops are discussed. These lead to the development of our guiding hypotheses. We then present our approach to investigating group performance in the central highlands of Kenya, and some of the issues and challenges encountered. The analytical methods used to assess performance of groups and to analyse the factors affecting group performance are described and the results presented and discussed. The main lessons for research methods and for clients of empirical information are summarized in Section 4.

1.1. *Issues and challenges relating to measurement of group performance*

There are a number of ways to assess performance of groups. Measuring the outputs or direct benefits is arguably the most important step, for these are what directly influence the welfare of group members. In Central Kenya, common types of direct benefits include cash or credit from merry-go-rounds or risk-coping groups, improved livestock breeds, animal fodder, household goods, knowledge, and spiritual uplifting. Some of these can be difficult to quantify, so proxy measures may need to be identified to reflect such benefits. Our surveys attempted to capture both direct benefits as well as an assessment of factors influencing how well groups function.

The manner in which the performance variables are assessed matters. Three major types of methods are respondent assessment/appraisal, direct measurement, and enumerator assessment. The first has the advantage of being able to obtain measures that reflect the valuation of the beneficiary. It also allows for assessments to be made for a wide range of performance indicators. Direct measurement is useful for some aspects of performance, especially where quantification is sought and the benefit is both durable and visible, for example, new livestock breeds or seedlings produced. Enumerator assessment, on the other hand, is most relevant when attempting to assess the *quality* of tangible outputs (e.g., nursery quality, watershed quality). The advantage of enumerator assessment is that he/she may have specific skills in assessing quality not shared by all respondents, and the method can be standardized so that the resulting values can be compared across respondents.

A final aspect that needs to be taken into account when assessing performance concerns the unit of observation. Enumeration at the group level is advantageous in that it allows for discussion and further probing. One disadvantage of group-level approaches is that it may be more difficult to quantify contributions and benefits, unless these are equally shared among all members. Second, some responses may not be candid if group leaders are present. Thus, measuring performance at the individual member level is also valuable. The advantages are basically the disadvantages of the group-level approach, i.e., it now becomes possible to capture differing individual benefit levels, and candid responses are more likely. A disadvantage of this level lies in the potential biases that arise with the selection of non-representative members.

1.2. *Lessons from the literature*

Performance, of course, can be measured in many ways. Benefits from groups are diverse and are realized at the individual/household level, the group level, and even supra-group level, e.g., a community. Thus, performance may be measured in many ways and analytical approaches to understanding patterns of performance are equally varied.

Beginning with household-based studies [Narayan and Pritchett \(1997\)](#) found that investments in social capital (defined as frequency of group membership and characteristics of groups) have a much larger effect (5–8 times) on household incomes than investments in human capital such as education in rural Tanzania. They also

conclude that group performance was positively influenced by communities' past ability to organize cooperatively. A number of studies have tried to examine how membership in a group may affect individual or household welfare indicators. The World Bank Local Level Institutions (LLI) studies from Bolivia, Burkina Faso, and Indonesia is perhaps the best known of these (Grootaert, 2001). In that study, the authors try to isolate and quantify the effect of different forms of social capital on asset accumulation and expenditure. In particular, they examined the effect of heterogeneity of the groups to which individuals belonged, the number of groups, and active participation in decision-making. They find that social capital does contribute to welfare, especially among the poor, and that among social capital dimensions, heterogeneity of group has a particularly positive impact. Similar positive relationships between income and group membership are reported in Haddad and Maluccio in rural South Africa (2002), Mushi (2000) for rural Tanzania, and La Ferrara (2002) for women in the slums of Nairobi.

Studies that have examined performance at the group level have often targeted specific types of groups in assessing performance. One type of activity that lends itself to quantification is micro-finance. Sharma and Zeller (1997) analysed the factors related to loan defaults by groups in Bangladesh. Default rates increased with higher loan amounts, a greater proportion of males in the group, and with lower reliance on farming by group members, among others. de Haan (1999) and de Haan et al. (1996) examined birth and pass-on rates between groups and the adoption rate among individuals for dairy goat groups in Kenya. Pass-on rates were highly related to improved incentives and the governance structure of the group, while adoption rates were positively influenced by the density of associations among group members. In Kenya, Hambly (2000), studied the longevity of women's tree planting groups and found that non-performance (i.e., collapse) of groups was related to inequitable social structures. In their review of the literature Agrawal and Goyal (2001), found that medium-sized groups are often more likely to be successful than either small or large groups.

Straddling between group and supra-group level analyses are many of the studies that look at management of common property resources. Irrigation is one area where considerable progress has been made in assessing the effectiveness of group management. There are good summaries of indicators for the effectiveness of group management for irrigation in Molden et al. (1998) and Dayton-Johnson (2001), and Bardhan (2000) provides an analysis of group performance in irrigation. Similarly, Tachibana et al. (2001) and Sakurai et al. (2001) offer indicators of forest management and an analysis of the impact of alternative management regimes (e.g., formal user group vs. state management) on these indicators.

In summary, there have been a number of papers that have attempted to assess group performance. Some gaps still remain. First, how can one quantify some types of group outputs – those that may relate to intangible outputs or whose outputs may differ according to beneficiary? Some self-help groups may fit in this category. Second, how can one compare different types of outputs across groups – what can be the common currency? Finally, what role should costs or contributions play in assessing performance? Existing studies have focused strongly on gross gains rather

than net gains from groups or collective action. We shall discuss how we managed (or not) to deal with these challenges.

2. Methods

In this study, team members were steered into specific areas of focus through a demand-driven process that consisted of a series of consultations with stakeholders from government, NGOs, private sector and farmer groups. These ‘advisors’ were mainly interested in gaining a better understanding of factors contributing to the performance of groups. They challenged the study team to help identify factors behind success and failure of collective action, be they structural, procedural, or otherwise. Stakeholders felt that such information would not only be highly useful to the participating groups themselves, but also valuable to the many organizations (including government) that work with groups.

In the rest of this section, we present in detail the methods used and the type of data collected to try to assess group performance in two separate exercises.

The first exercise was aimed at providing an overview of all types of groups operating four rural sites. The plan was to measure participation of adults in collective action, which could then be later linked to group-level information of a variety of groups with diverse objectives. The investigation describes the different groups and identifies the level of collective action by activity, but the quantification and comparison of performance indicators was not feasible for such a diverse set of groups. The second exercise identified a common task of a smaller sample of groups and for which performance was thought to be quantifiable. On this smaller sample, we also undertook quantitative analysis to assess the determinants of a number of performance indicators of collective action. This investigation includes groups that established nurseries of *Calliandra calothyrsus*, a fodder tree that produces high-quality animal fodder and is a particularly good source of feed for dairy animals.

We constructed three performance measures from the group survey and three from the household survey that were used as dependent variables in six separate regressions. For each dependent variable, three regressions models were run: one that included the effect of location and structural variables, a second that added functional variables, and a third that included characteristics of group members to ascertain heterogeneity and wealth levels.

The models use a number of explanatory variables. *Geographical location* is used as a control variable, since the performance indicators are expected to be affected also by climatic conditions. Change of group purpose is expected to be positively related to performance following the hypothesis that past coordination is conducive to cooperation in new activities. Following Agrawal and Goyal (2001), we expect that group size has a concave relationship to collective action performance, indicating that medium size groups perform better. Group heterogeneity measures can work in different ways. Heterogeneity might be expected to lead to diverse interests of groups and therefore lack of cooperation. On the other hand, successful completion of activities often requires the integration of diverse skills that might be best found

among heterogeneous groups. In the case of *Calliandra*, nursery performance would require commitment and may be favoured by more homogeneity. The level of formality of group was expected to reflect seriousness of purpose and commitment and therefore to be positively associated with performance. We likewise expected that the type of group might matter, namely those groups who were formed for dairy production would take a keener interest in an activity that was related to livestock feeding systems. Certainly the leadership capability of the chair is extremely important to group success. We did not have reliable measures of these and therefore attempted to see if other more observable characteristics of chairman (e.g., gender and age) had strong links with performance.

The datasets emerging from these two exercises are described in the following sections.

2.1. *The case study exercise*

Four Kenyan case study sites were selected after stratifying the region by agro-ecological zone. The reason for choosing this stratification variable was based on the hypothesis that the forms of collective action used by people would be different depending on agricultural potential. Two sites were selected in high potential zones (Kirinyaga, Nyeri) and two in less favourable zones (drier portions of Meru Central, Embu). In total, 442 household interviews were conducted. They included detailed information on both the husband's and wife's involvement with groups (where both were present). For this exercise, the concept of group was somewhat formal, in that the group had to have a name and a defined leadership. Thus, we did not collect information on the many types of informal social arrangements. We interviewed 87 groups in total from the same four sites, using a comprehensive questionnaire covering aspects of history, structure, leadership, decision-making, contributions, and benefits.

The case study approach turned out to be quite ambitious in the context of Central Kenya. Most adults belong to groups, and often belong to more than one. Similarly, there are a surprisingly large number of groups and they each appear to take on multiple activities. This generated rich material for descriptive analysis as we report below. However, the diversity both from the group and household surveys created numerous problems in terms of generating comparative performance variables and therefore the dataset had much less usefulness for analysing analytical relationships (such that several study hypotheses could not be properly tested).

The approach of fully enumerating existing or recently disbanded groups within a defined area and then interviewing a majority of their members through the use of a census did not work out as planned. We did not fully succeed in finding disbanded groups – individuals may have not remembered these well or were reluctant to provide information on them, not knowing our motives. Also the matching of group and individual data was difficult because of mismatch in naming conventions of groups (particularly because a few respondents noted that they did not know the real name of the group to which they belonged). Moreover, groups do not follow administrative boundaries and we found a large number of individuals belonging to groups that were outside our enumeration area.

In addition, the analysis of the performance of a wide range of groups and their activities using our four case study sites was infeasible because of the following: (1) quantification of benefits and contributions was very difficult, partly because many activities were ongoing, and others were contingent upon certain events occurring; (2) we were not often able to interview the husbands (who were away from the farm much of the day) and the wife was unable to answer detailed questions about the husband's activities in groups; (3) group responses to a few questions were thought to be biased in some cases owing to the domination of leaders among the respondents; (4) individual respondents were sometimes not precise on group size and composition because of difficulties in recollection, and the fact that these may change frequently; (5) it was difficult to find a common unit of time over which contributions and benefits for diverse activities could be measured.

2.2. *The Calliandra group exercise*

The inter-institute National Agroforestry Research Project, based at Embu, has been working with farmer groups in the dissemination of fodder trees in Central Kenya since the early 1990s (Franzel et al., 1999). These groups were initially identified with the help of extension and NGOs and had volunteered to participate in establishing tree nurseries. Among the many groups that agreed to try establishing *Calliandra* nurseries (about 120 in total), 40 were selected in order to assess nursery performance and to elicit a range of information about each group. The population was stratified on the basis of group purpose and on geographical location. A roughly equal number of dairy groups, catchment groups (originally formed by extension to coordinate soil and water conservation efforts in “catchments”, or village clusters), and general self-help groups (including women's groups) were selected randomly after this stratification. These 40 groups are spread across a wide and diverse landscape, covering six different districts in Central Kenya: Nyeri, Maragwa, Kirinyaga, Embu, Meru Central and Meru South. In September 1999, prior to distribution of the seedlings, we visited each of the nurseries and collected information on inputs, management, and nursery outputs. In 2000, this was followed up with monitoring of new seedling production and distribution and a detailed questionnaire on group characteristics, history, procedures, and other activities. Finally, we supplemented this with interviews of three to four members from each group, resulting in a total of 151 household-level surveys completed. These were aimed at gauging the performance of the seedlings on-farm.

The study of *Calliandra* nursery groups was conceived in order to overcome some of the hurdles involved in evaluating group performance. By focusing on one particular activity (production of seedlings) being undertaken by many and different types of groups, performance comparisons across these groups became feasible. First, it was relatively straightforward to assess the group output seedlings. Second, information was available on the quantity of seed originally given to each group, so the number of seedlings produced per quantity of seed received could be determined. Third, it was easy to identify the individual beneficiaries. It then became possible to quantify the number of seedlings received, planted, and that survived on members' farms.

As for quality, the research team was well acquainted with nursery and tree planting operations and could thus easily distinguish between high and low quality of management of the nursery and the *Calliandra* on farms.

One potential problem in measuring the performance of trees in nurseries or planted on farms is that they are very prone to climatic and biological risks. Thus we also made use of some intermediate measures of performance. There was also a limitation of our performance assessment related to the fact that there was an upper limit on the quantity of seed distributed to interested groups during the first season. Thus while ‘less than average’ performances could still be distinguished, it may have been that some groups could have generated much higher numbers of seedlings (i.e., performed even better) had supply constraints not been in place. Another drawback of relying on the *Calliandra* groups exercise to understand the factors behind the performance of groups in the region is that the groups studied are not necessarily representative of collective action in the region, i.e., the majority of activities undertaken by groups in Central Kenya are not highly related to tree nurseries and planting. Second, the *Calliandra* groups had volunteered to accept this new activity and as such, there may be some selectivity bias within the sample, i.e., they are likely to be relatively well functioning groups and above-average in terms of performance.

3. Results and discussion

3.1. Brief description of groups in Central Kenya

The case study involved 87 group surveys, but most of the data we present reflects the responses of 82 groups, because of missing data for five groups. Table 1 displays the frequency of purposes for which these groups were originally formed. Self-help and risk-coping were the two most frequently cited purposes for group formation. Other common purposes were merry-go-rounds and forms of credit, building of household assets (ranging from utensils to water tanks), enterprise and marketing

Table 1
Purpose of groups at inception

Stated purpose of group at inception	Frequency (%)
General self help/empowerment	17 (20)
Provision of assistance during hardships	16 (19)
Loans/merry-go-round	13 (15)
Building household assets	13 (15)
Enterprise and marketing	10 (12)
Farming and NRM	10 (12)
Dairying	7 (8)
Total number	86 (100)

Source: Case study group survey.

(e.g., of coffee or milk), improved farming or soil management, and within this latter category, improved breeding for dairy animals.

Most groups were formed autonomously, with only 17% formed with strong involvement of external organizations (often with cash or material injections). Farming groups were far more likely to be initiated by external organizations (50%). Most of the groups surveyed had been established since 1990 (81%) and 48% were established since 1995. The sheer diversity of activities undertaken by groups suggests that existing groups prefer to build on their past experiences by taking on new activities rather than forming new groups.

Average group size at group inception was 36 members and this increased to 45 members by the year 2000. At both points in time, women comprised about two-thirds of all members. As many as 42% of groups were exclusively comprised of women, and this was constant over time. The size of groups was not highly related to group purpose. Groups self-appraised themselves as highly heterogeneous, apart from gender and occupation (farming). Between 80% and 90% of groups classified themselves as having diversity in age, education, religion, wealth level, and kinship. These groups are considerably formalized in the sense of having by-laws (95%), bank accounts (74%), a constitution (63%), and are registered (72%). All but one had regularly scheduled meetings for general members, and 72% of executive committees met regularly. In terms of decision-making, general members discuss and decide upon most major issues in almost all of the groups.

There are a large number and diversity of activities undertaken by the groups (see Table 2). Within the past five years, the groups reported having undertaken 205 activities, 43 of which could be identified as distinct. Groups do take on several activities, making the analysis and comparison of performance very complicated.

Table 3 gives some indication as to the motivation for types of activities undertaken by groups. For many types of actions, the figures show the percentage of households preferring to act collectively, whether in a formal group, or more informally with family or friends, as opposed to acting individually. Collective action is overwhelmingly desired for helping with large expenditures such as funerals and weddings and for spiritual well-being. There is fairly strong interest in collective action for processing crop output (55% of households), selling milk (46%), acquiring agricultural information (33%), selling crops (32%), breeding livestock (30%), and obtaining water (26%). At the other extreme, there is a strong preference for individual action in selling livestock, obtaining firewood, and acquiring livestock.

Quantification of the diverse types of benefits was challenging. The group level data show that only about 8% of group benefits (which included cash, loans, credit on farm inputs, household assets) could be classified as non-quantifiable on conceptual grounds. But the majority of cases (52%) involved benefits that were not quantifiable for lack of precision on quantities or time periods. There was more success at quantifying benefits and contributions at the household level, but there were large discrepancies between contributions and benefits reported both by groups and individuals. These discrepancies result from difficulties in distinguishing between actual and potential beneficiaries (such as when payments are made upon death of a relative) as well as recording the exact frequency of contributions.

Table 2
Frequency of activities undertaken by 81 case study groups in Central Kenya

Activity	Frequency
Assist members during hardship	44
Merry-go-round	39
Buying goods	21
Tree nurseries and planting	15
Saving and credit	11
Buying goats	10
Cash contributions	10
House construction for renting	4
Wedding assistance	3
Constructing water tanks	3
Processing and marketing coffee	3
Bee keeping	3
Farming	3
Bank savings	2
Buying and selling livestock	2
Constructing wells	2
Digging cut-off drains	2
Paying school fees	2
Pig rearing	2
Horticulture	2
Making cooking stoves	2
Prayer	2
Provision of AI/vet services	2
Allocation of water	1
Hiring of society's vehicles	1
Making/selling table cloths	1
Zero grazing	1
Poultry keeping	1
Constructing coffee factory	1
Sewing machine and knitting	1
Clearing of mud/stones	1
Terrace construction	1
Communal work	1
Constructing pit latrines	1
Distribution of food	1
Growing of french beans	1
Renting of coffee farms	1
Renting of land	1
Buying and selling milk	1
Buying farm tools	1
Buying iron sheets	1
Buying water tanks	1

Source: Case study group survey.

3.2. Description of Calliandra groups

Among group types, we selected 15 self-help groups, 13 catchment groups, and 12 dairy goat or cattle groups. This is not at all representative of the distribution of

Table 3
Household preferences for collective versus individual action

Activities	% of hhs relying on collective action
Purchasing inputs	22
Obtaining agric. information	33
Processing crop output	55
Selling crop output	32
Obtaining livestock feed	18
Breeding livestock	29
Health services for livestock	30
Acquiring livestock	15
Selling milk	46
Selling livestock	7
Obtaining tree seeds	16
Raising tree seedlings	22
Obtaining firewood	9
Obtaining water	26
Caring for children	16
Funeral expenses	98
Wedding expenses	99
Enhancing spiritual well-being	90

Source: Case study household survey.

groups on the ground. For example, catchment groups, and to a lesser extent, dairy livestock groups are over-represented in this sample. A chief difference between these groups and those enumerated for the case study exercise is that about half of the *Calliandra* groups had been formed with strong input from external agencies (the catchment groups and many of the dairy groups). The average age of groups was 3.6 years, with only two formed more than 10 years prior to the survey. A second notable difference between the *Calliandra* groups and the case study groups was that the size of the *Calliandra* groups was considerably smaller (with an average of 20 members in 2000, compared with 40 members for the case study groups). This may be explained by the fact that catchment groups were purposely kept relatively small and seedling transportation logistics put a practical limit on the size of nursery groups. Some groups have members that are relatively similar in gender, age, education, while others are quite diverse. Women chair 11 of the groups. As was found with the case study survey, most of these groups had formal features – registration, by-laws, or constitutions.

3.3. Estimates of performance of *Calliandra* groups

The number of useful performance measures we were able to derive is much higher for the *Calliandra* groups than for the case study groups. We constructed three performance measures from the group survey and three from the household survey. At the nursery stage, the three measures were: (1) an index of inputs applied to the nursery; (2) an enumerator rating of nursery quality; (3) the number of *Calliandra* seedlings produced per member. At the on-farm stage, the three measures were:

(1) an index of management tasks applied to the seedlings by the household; (2) an enumerator rating of the quality of the seedlings growing on the farm; (3) the survival rate of the seedlings. For each of the measures originating from the household survey, we calculated the mean level for each nursery group in order to create a group-level variable.

The input index was calculated by averaging input contributions across individuals involved in the nursery. The variable could take values between 0 and 4 and our range was from 0.25 to 3.5. The management index was calculated by simply adding the number of tasks applied on-farm and then averaged across the four farmers of the group. The management index could range between 0 and 12, but our data show the actual distribution to be between 2.5 and 9.25. Enumerators rated nursery quality as poor, fair, good or very good. We assigned quantitative values from one to four to these ratings, which were used in determining mean values for the three or four households within each group. There was significant variation in these ratings, with 17 nurseries (43%) being rated as good or very good, and the remaining 57% rated as fair or poor. From the household survey, sixteen groups received a quality rating (averaged across the individual respondents from the group) for the transplanted *Calliandra* of good or excellent. The average number of *Calliandra* seedlings per member was 235, which was identical to the median number of seedlings per member. Individuals had between 41 and 636 seedlings (≈ 500 *Calliandra* trees are required to provide year-round supplemental feed for one dairy cow). The mean seedling survival rate was 47%, with only one case of complete failure (that is, all surveyed members of the same group had complete failures). About one-fourth of groups had an average survival rate of below 30% and another one-fourth had survival rates in excess of 70%.

While it was expected that the *Calliandra* performance measures might be strongly related, we found that this was not universally true. The strongest correlations were among the household-level measures. The correlation coefficient between average *Calliandra* quality and average survival rate was 0.67, for instance. On the other hand, none of the measures from the group survey was significantly correlated with any other. We had expected that higher inputs would be strongly related to better performance (i.e., the input index – nursery rating to be highly correlated), for example, but this was not the case. The group and individual indices of management and inputs, on the other hand, were strongly linked to each other. This was expected since the same people are typically involved in both activities. Comparing performance variables at household and group levels, we found that *Calliandra* per member (from the group survey) was highly positively linked to the on-farm management index (from the household survey) as well as to the quality of *Calliandra* seedlings rating (from the household survey). The survival rate, arguably the most important ‘bottom-line’ performance indicator at the household level, was not statistically linked to any nursery performance indicator.

3.4. Factors related to *Calliandra* group performance

Using each of the six performance variables described in Section 3.2 (from the group survey: nursery inputs index, nursery quality, number of seedlings per

Table 4
Regression results on various performance measures for the *Calliandra* nursery groups

Explanatory variable	Dependent variable (performance measure)					
	Group survey (n=40)			Household survey (n=151)		
	Index of inputs on nursery	Nursery rating	<i>Calliandra</i> per member	Index of management on farm	Rating of <i>Calliandra</i>	Survival rate of <i>Calliandra</i>
Geographical location	Positive and Negative					
Age of group						
Dairy group	Positive					
Catchment group	Positive					
If group purpose changed over time	Positive					
Size of group	Concave – positive, turning negative					
Age of chair						
Male chair	Negative					
Level of formality of group	Negative					
Age diversity of group	Positive					
Proportion of members with secondary education						
Degree of democratic decision making						
Value of livestock of group members	Positive					
R-squared	0.254	0.328	0.629	0.154	0.303	0.276

Note: “Positive” or “Negative” imply a linear relationship that is significant at a 0.10 level or below. Both are written in for geographical location meaning that some are positively and negatively related to each other. For size of group, one relationship was concave, initially positive and then turning negative. Finally, a blank means that the relationship was not statistically significant.

Source: *Calliandra* group and households surveys.

member; from the household survey: management index, seedling quality, seedling survival rate), three separate regression models were tested. The first model examined the effect of location and structural variables for the 40 groups. The second model added functional variables such as the level of formality of the group and characteristics of the group leader. The final regression added characteristics of group members to ascertain heterogeneity and wealth levels. Table 4 displays the list of variables and notes the cases, where coefficients had statistically significant relationships.

As can be seen, very few variables turned out to be significantly related to performance of *Calliandra* in the nursery or on individual farms. Moreover, adjusted *R*-square values were generally quite low (the exception was when the dependent variable was *Calliandra* per member). Geographical location had far less effect than expected given the drought that hit the region during 2000 (i.e., nurseries at different locations within the region were affected almost to the same extent). The most important variable appeared to be whether group purpose (or activity emphasis) changed since inception. Groups who had taken on new directions performed better on three of the six performance measures. Catchment groups performed better according to the *Calliandra* seedlings per member and survival rate performance measures, especially compared with self-help groups, although this did not hold for all regression models. This result is not so surprising since the catchment groups received substantial training from extension on a host of farming-related activities. No other explanatory variable had a significant effect on more than one dependent variable.

The implications of this analysis are twofold. First, choice of dependent variable clearly matters in one's interpretation, as the significance of the explanatory variables varies. Second, and despite the first implication, the prediction of *Calliandra* performance is not significantly linked to any easy-to-measure indicator. In other words, this analysis does not support targeting dissemination towards particular types of groups.

4. Conclusion

The first portion of the paper was devoted to methodological issues surrounding our ability to measure group performance. The preponderance of evidence would suggest that it is not straightforward to quantify group performance, and that attempting to triangulate information from group and individual respondents is also difficult. The 'census' approach to documenting the number, variety and diversity of groups probably raised more questions than it answered, and did not allow us to get at some issues we intended it for, such as learning about failed or disbanded groups.

Focusing in on a particular group activity allows for a more rigorous measurement of group performance at different levels (household, group, community), but a large sample is needed to identify statistically significant factors explaining those performance measures. For example, we were able to develop and assess performance indicators for one specific type of collective task, the production of *Calliandra* tree seedlings. But even in this case, we found that the choice of indicator is critical, since several presumed positive relationships between performance measures did not

materialize. In our view, there remain great challenges in assessing performance of groups whose tasks are diverse, whose outputs may be components of larger and/or longer-term goals (e.g., provision of piped water, breeding of livestock), and whose activities involve variable timing of contributions and benefits. While this region may be somewhat unique compared with other areas in Africa in terms of the number and diversity of groups, we suspect that such approaches taken elsewhere would encounter similar challenges.

On the empirical side, we tested for the effect of several different factors on group performance. The evidence suggests that groups are very dynamic in developing new activities. This supports the notion that bonding social capital, in the form of trust, is critical and more valued than the reformation of groups with different skill mixes. This may work especially well in Central Kenya, where group sizes are quite large and membership is diverse, allowing access to a wide range of expertise.

There is some evidence that group size matters – in some of the analyses, performance was highest for middle-sized groups, as opposed to the smallest or largest ones. We did not find that performance was linked to variation in diversity of membership. Likewise, a group's age was not linked to group performance in any of the multivariate analyses. New ones and old ones were equally likely to perform well. In summary, we did not find that structural factors contributed significantly to group performance, an indication that self-selection mechanisms were working well.

Acknowledgements

The authors thank Brent Swallow, Steve Franzel, Rossalyn Gichimo, Charles Wambugu, Festus Murithi, and Charles Lyamchai for their technical inputs and logistical support for the study. We also thank the many field collaborators in Central Kenya who provided extremely thoughtful insights about collective action. Lastly, we thank the participants at the CAPRi workshop and two reviewers as well as Ruth Meinzen-Dick and Monica Di Gregorio for their helpful suggestions.

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