Collective action in commercial mushroom production: the role of social capital in the management of informal farmer groups in Swaziland

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ABSTRACT

With over 90% of mushroom producers having opted to participate in the industry through informal farmer groups, this paper sought to identify the key factors that unify members of informal collective initiatives. In contrast to formal organisations, which are regulated by law, informal groups are fully autonomous and not regulated by any legal instrument in Swaziland. Based on a conceptual framework that uses social capital dimensions to study collective action, trust, cooperation and communication were identified as the key elements responsible for ensuring cohesion in informal groups engaged in mushroom production. Further analysis indicated that trust is positively influenced by gender, age and religion, while cooperation was found to be influenced by members' dependence on mushrooms for food. Communication, on the other hand, was found to be positively influenced by the level of trust and member cooperation. The empirical evidence indicates that members from communities characterized by positive cognitive social capital are most likely to engage in voluntary collective action in an attempt to improve their livelihoods. The study, therefore, recommends that informal groups developed voluntarily by community members should be encouraged and embraced as an important element of Swaziland's development agenda.

Keywords: collective action, social capital, mushrooms, Swaziland

1. INTRODUCTION

In the context of globalization and market integration, small-scale farmers often find themselves at a major disadvantage compared to larger and better-endowed commercial farmers who have better access to information, services and capital, and can afford to produce large volumes of quality products demanded by the market (Poulton *et al*., 2006). In an attempt to overcome such challenges, most developing countries are promoting collective action through formulating farmer organizations as a key intervention to enhance small-scale farmers' access to markets (Berham and Chitemi, 2009). Defined by Olson (1965) as the voluntary action taken by a group of individuals who share mutual interests and expect to achieve common benefits, collective action in agriculture reduces transaction costs through joint procurement of inputs and marketing where possibilities of bargaining could emerge (Holloway *et al*., 2000; Ortmann and King, 2007b). There are also possibilities for sharing skills and information among members as some could be more experienced and knowledgeable than others (Matungul *et al*., 2001). Farmers also enhance their chances to access financial services, innovation technology services (education, extension, research) and policy advocacy (Delgado, 1999). Furthermore, co-operating partners, including government agencies, generally prefer working with groups to individuals as they are able to reduce operational costs while promoting social control to ensure sustainability of interventions (de Haan, 2001).

Farmers in Swaziland are free to associate and produce in whatever form they choose. Apart from producing as sole proprietors, farmers venture into agribusiness as (i) co-operatives, companies or associations. Of late, some farmers have opted to venture into agribusiness as informal groups or organizations that are not governed by any legal

instrument. The prominence of informal organizations, as noted by Cook and Plunkett (2006), warrants the attention of policy makers with the view of considering them in national programmes meant to advance rural development initiatives. Pandolfelli *et al*. (2008) posit that the preference for informal to formal collective action is, to a large extent, influenced by the notion that informal organizations are generally easy to form, flexible and responsive to members' shifting needs. Even though there are success stories attributed to collective action, some initiatives may not be successful in the long-term. Challenges normally encountered by farmer organizations, particularly cooperatives, are discussed by Cook (1995) and Ortmann and King (2007a).

While some attempts have been made to establish the determinants of collective action in the past, the focus has either been channelled towards socio-political groups (e.g., Alesina and LaFerrara, 2000; Jicha *et al*., 2011) or participation in groups engaged in the management of natural resources (e.g., Araral, 2009). With the exception of La Ferrara (2002), not much effort has been made to study the determinants of collective participation in agricultural production in the African context. However, the point of departure from La Ferrara (2002), who studied participation in cooperatives and associations in Tanzania, is that besides using a different conceptual framework, this study focuses on informal mushroom producing groups, which are totally autonomous and not regulated by any legal instrument in Swaziland. The contention is that it would be illogical to assume that the incentives of individuals to participate in formal organizations and their behaviour thereafter would be similar to those of informal organizations. The difference between these two settings can only be addressed through empirical investigation. With over 90% of total mushroom producers involved in group formations and operating within the 'informal' context, this study is very instrumental from a policy perspective as it provides an insight on whether (or not) informal farmer groups could be promoted as an option for advancing smallholder agricultural development initiatives in Swaziland. The study adopts a conceptual framework postulated by Ostrom and Ahn (2009), where collective action is analysed using dimensions of social capital. The dimensions represent cognitive and structural forms of social capital, enabling the study to deal with the phenomenon more conclusively than has been done in the past. Moreover, the use of social capital dimensions provides an opportunity to further analyze the factors likely to enhance (or inhibit) the prospects of maintaining collective participation in group activities.

With the above motivation, the rest of the paper is organized as follows: Section 2 provides an overview of the mushroom industry in Swaziland, while section 3 outlines the adopted conceptual framework, sampling procedure and methods of data analysis. Section 4 presents the empirical results and discussion. The last section concludes the paper and provides policy recommendations.

2. MUSHROOM PRODUCTION IN SWAZILAND

The mushroom development programme was introduced by the Swaziland government, in collaboration with the United Nations Development Programme (UNDP), in 2001. Prior to 2001 mushrooms were not cultivated locally and their introduction was part of a policy intervention meant to diversify the country's agricultural base, focusing on high-value commodities that have not been explored by local farmers despite having a high local and international market demand (ITC, 1998). Mushrooms, for instance, are very easy to produce and are widely recognized for their nutritional and medicinal values (Guillamón *et al*, 2010). Swaziland is also one of six African countries[1] supported by the New Partnership for Africa's Development (NEPAD) to promote mushroom production and processing into medicinal products. The NEPAD programme commenced in 2009 and Swaziland is targeted for the establishment of a regional mushroom gene bank (SANBio, 2010).

In attempting to give the mushroom-growing sector a prominent position and emphasize the possibility of developing a sustainable economic activity, the Swaziland government, through the Ministry of Agriculture, offers free training in basic mushroom production, extension services, high quality spawn (mushroom seed) at a very nominal fee and free substrate bags. Currently, the emphasis is on the oyster mushroom for the reason that it is comparatively the easiest and least expensive to grow (ITC, 1998; Chang and Miles, 2004). There is also a wide choice of oyster mushroom species available for cultivation under different climatic conditions (Sher *et al*., 2010) using a range of substrate materials, most of which are generated from agricultural, forest and food processing waste (see Oie, 1991 for details). Unlike other agricultural enterprises, oyster mushrooms are produced in enclosed structures, whose environment (temperature, humidity, light and ventilation) is controlled by the producer. Production requires less water and may not necessarily be dependent on rainfall (Oie, 1991; ITC, 1998).

Besides having a relatively low capital cost, the enterprise does not require the use of fertilizers and pesticides, yet its profit margins are relatively higher than conventional agronomic crop enterprises such as maize (Chiroro, 2004). Furthermore, the enterprise can produce additional income to people living in the rural areas, who may utilize their residues from other agricultural products as substrate materials to grow mushrooms (ITC, 1998). This form of diversification could enable rural producers to make returns within a short period of time as a single production cycle of dry maize, for instance, which takes approximately six months, would be enough to produce at least two cycles of oyster mushrooms (Chiroro, 2004).

Swaziland is currently a net importer of mushrooms and the industry is mainly comprised of rural-based smallholder producers. Over 90% of these producers have opted to produce in group formations. Besides the free training and substrate bags offered by government, producers raise their own capital to erect production houses, procure production inputs and manage their daily operations. Farmers also have the responsibility to identify product markets, and currently they sell their mushrooms through three main channels identified by order of importance as; (i) retail market (comprised of

supermarkets, restaurants and hotels); (ii) the farm gate; and to a less and insignificant extent (iii) middlemen; Those who sell to the retail market normally transport the produce to the buyer, whereas selling at the farm gate barely requires transportation as the mushrooms are sold from where they are produced and customers generally consist of community members. Middlemen, on the other hand, buy the mushrooms from where they are produced. Besides the absence of written marketing contracts and having less bargaining power in setting exchange prices, mushroom producers prefer the retail market as it offers a comparatively higher producer price and a relatively more stable market. With the retail market, producers do not have to rely on unpredictable buyer turnout as is the case with the farm gate and use of middlemen options.

3. METHODOLOGY

3.1 Conceptual framework

Based on a conceptual framework postulated by Ostrom and Ahn (2009), collective action for mushroom producing groups in Swaziland is studied by using dimensions of social capital variables. Despite being defined differently by various authors (see Field, 2003), social capital is manifested in the relations established among people, and is believed to reside in peoples minds (Coleman, 1988). The roles that people recognise, accept and perform in a group and the attitudes and beliefs they hold, play a crucial role in structuring their relationships with other group members. When people interact or plan to interact with one another, social capital is an attribute that operates within and between individuals. Hence, the study's basic premise is that social capital promotes and facilitates interaction among individuals, and as a result the trust generated through interaction reduces opportunistic behaviour, thereby developing a foundation for collective action (Collier, 2003).

3.2 Sampling and data collection

This study forms part of a wider study on mushroom production in Swaziland whose data were collected between December 2010 and January 2011. The total number of mushroom producers as at November 2010 was 271, of whom 16 were individual producers and the rest produced in informal groups (MDU, 2010). As shown in Table 1, a total of 11 groups were identified and the sample from each group was estimated based on probability proportional to size from a total representative sample of 159. The representative sample of 159 was drawn from the population of 271, following the Krejcie and Morgan procedure (1970). Table 1, however, excludes the sample of individual producers. All 11 groups involved in mushroom production were found to operate in predominantly two models (A and B). In model A, besides defining their own rules and procedures, members produce mushrooms under one roof and share all production and marketing activities. In model B, members also define their own rules and procedures; however, instead of producing under one roof, each member manages his/her own production house. Groups that operate using model B share all preparatory activities, except management of the growing house and marketing of products.

Table 1. Mushroom producing groups in Swaziland, November 2010

Region	Area	Group size	Sample size[c]
Lubombo	Ncandweni [a]	16	9
	Sinceni [a]	16	9
	Ngcina/Mpolonjeni [a]	35	21
	Vuvulane [a]	10	6
	Ka Shoba [a]	21	12
	Mangweni [a]	81	48
Hhohho	Nkhaba [a]	4	2
Shiselweni	Mbangweni [b]	38	22
	Zombodze [b]	25	15
	Dumako [a]	5	3
	Matsanjeni [a]	4	2

Notes: [a] Group produces using model A
[b] Group produces using model B
[c] Total sample excludes 10 sampled individuals
Source: Mushroom Development Unit, Ministry of Agriculture (2010)

The choice of which model to adopt rests with the membership. Among the 11 groups, only two were found to operate using model B. For purposes of comparison, two groups were randomly identified from each category. These were Mangweni under model A (with 48 respondents) and Mbangweni under model B (with 22 respondents). Worth mentioning is that besides adopting different models of operation, these two groups are located in different food economy zones. Mbangweni is located in the timber highlands, whereas Mangweni is located in the Lowveld cattle and maize food economy zone.

3.3 Data analysis

The first task was to identify reliable social capital indicators which, according to the adopted conceptual framework, would be considered as determinants of collective action. These are key elements responsible for establishing and maintaining working relations among group members. Hence, they constitute the foundation for the management and sustainability of informal mushroom producing groups. Drawing from Mitchell and Bossert (2007), the social capital indicators were constructed to identify both cognitive (confidence and trustworthiness) and structural (communication, commitment, conflict, cooperation and satisfaction) forms of social capital. The difference between cognitive and structural forms of social capital, as noted by Upholf and Wijayaratna (2000), is that the latter facilitates collective action through mobilization and management of resources. Structural social capital makes it easier for people to engage in mutually beneficial collective action by lowering transaction costs as well as accumulating social learning. Cognitive social capital, on the other hand, constitutes individual mental characteristics that predispose individuals towards mutually beneficial collective action (Upholf and Wijayaratna, 2000). As such, cognitive social capital provides a conducive environment for collective action. The selection of variables was based on field observations and related literature (e.g., Krishna and Uphoff, 2003). Presented in Table 2, the social capital

variables were measured using responses from group members and were captured using a Likert-type scale.

Table 2. Description of variables used to identify determinants of collective action

Variable	Label	Scale
I have a strong personal confidence in each group member	T1	1 – 5[d]
All group members are trustworthy	T2	1 – 5[d]
There is extensive communication in the group	Comm3	1 – 5[d]
Information is shared in a language and form understood by all members	Comm4	1 – 5[d]
There are no demonstrated conflicts within the group	Conf5	1 – 5[d]
I am willing to contribute towards group investments in future	Comit6	1 – 5[d]
Level of member cooperation in joint planning and decision making	Coop7	1 – 5[e]
Level of member cooperation in executing joint manual activities	Coop8	1 – 5[e]
Level of satisfaction with group performance towards achieving its objectives	Satisf9	1 – 5[f]

Notes: [d] 1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree
[e] 1-very low, 2-low, 3-moderate, 4-high, 5-very high
[f] 1-very dissatisfied, 2-dissatisfied, 3-neutral, 4-satisfied, 5-very satisfied

In contrast to previous studies (e.g., La Ferrara, 2002; Pargal *et al*, 2003; Araral, 2009; Jicha *et al*., 2011) that used proxy variables for social capital identified based on the authors' conjecture, key dimensions of social capital in this study were extracted from the variables in Table 2 using Principal Component Analysis (PCA). PCA constructs new variables, called Principal Components (PC_s) out of a set of variables, x_j′s, where the PCs are linear combinations of the x′s (Koutsoyiannis, 1992). The observed variables are transformed as follows:

$$PC_{i} = \sum_{j=1}^{p} a_{ij} x_{j}, \; i = 1,\ldots, k; \; j = 1,..,p \qquad (1)$$

where x_j′s are the k variables observed from the i^{th} member. The coefficients a_{ij}′s are computed such that the first principal component or dimension (PC_1) accounts for the largest possible share of variance in the original x_j, and the second dimension (PC_2) is chosen to account for the largest possible share of the remaining variance, and so on (Koutsoyiannis, 1992). The second stage in addressing the study objective required the estimation of a model to identify factors that influence collective action, using the identified PCs (or determinants of collective action) as dependent variables. Given that the analysis was done using group members as units of analysis, the independent variables were captured as members' attributes that are reported in the literature to have an influence on collective action. These factors are discussed in Section 3.4 below.

3.4 Factors that influence collective action in mushroom producing groups

3.4.1 *Demographic attributes* – Despite the absence of a clear theoretical background, demographic attributes of members are reported by Carpenter *et al*. (2004) to have a significant influence on collective action. A review of related studies indicates that demographic characteristics may be used to some extent to describe differences in perceptions on collective action and subsequent actions by members of certain organizations. These attributes include, among others, gender (Pandolfelli *et al*., 2008), age (Gachter *et al*., 2004; Diwakara, 2006), level of education (Helliwell and Putnam, 2007) and household labour endowment (Mushtaq *et al*., 2007).

Labour endowment is an important requirement in mushroom production. It was gathered during interviews that members are free to delegate family members to work on their behalf in the event they cannot avail themselves due to ill-health or engagement in other activities. In contrast to Mushtaq *et al*. (2007), this study considered members who were identified to participate in household agricultural activities. Hence, labour endowment was measured following Langyintuo and Mungoma (2008) in man-equivalents as: members less than 9 years = 0; 9 – 15 = 0.7; 16 – 49 years = 1; and above 49 years = 0.7. The concept of man-equivalents was adopted to account for labour contribution differences among household members. The inclusion of all categories (even school-attending children) is based on the fact that school-attending children normally participate in household agricultural activities, especially outside school-attending hours including weekends and holidays.

3.4.2 *Socio-cultural and economic heterogeneity* – The effects of socio-cultural and economic heterogeneity on collective action have been debated and analyzed at length (Jones, 2004; McCarthy *et al*., 2004; Ruttan, 2006; 2008), showing mixed empirical results. Economic inequality of households refers to the difference in wealth, income and access to credit, among other attributes, whereas socio-cultural heterogeneity refers to differences in ethnicity, religion, and cultural perception of the resource (Ruttan, 2008). Social heterogeneity is hypothesized to have a negative effect on collective action as different social norms could make creating and enforcing decisions more costly (LaFerrara, 2002; Ruttan, 2006). Furthermore, wealth heterogeneity could make finding agreements that are mutually beneficial to all more difficult as wealthier members may find it in their interest to assume leadership and benefactor roles within the group (Wade, 1988; Bardhan, 2000).

Following Fernando *et al*. (2003) wealth classes were identified based on household characteristics and asset ownership using cluster analysis. Variables used to classify households were primary source of power for lighting, primary source of power for cooking and primary source of domestic water[2]. Other variables included the number of usable valuable items owned such as cars, tractors, motorcycles, bicycles, television sets, radios and computers. Typical of the Swazi community, ethnic heterogeneity was not incorporated in the model as the study population was generally homogenous in this regard.

3.4.3 *Household's dependency on resource* – The extent to which households or group members depend upon a resource for their livelihoods (also known as salience) could be an important condition that influences collective action (Mushtaq *et al*., 2007). Dependency captures the intensity with which the household needs the enterprise for its subsistence. Dietz *et al.* (2003) contend that mushrooms must be salient enough to the members for them to invest time and money to improve the enterprise. Households were requested to rank their important sources of food and income, with mushrooms featuring as an option. The ranks were captured in descending order, with less numbers indicating less preference for food and income, respectively.

3.4.4 *Social capital-related attributes* – Variables under this category were meant to bring out the perceptions and attributes of members regarding collective action as influenced by social capital-related factors. The factors include members' perception of change in group size and the affiliation of members to other community groups, of which the latter was found by Haddad and Maluccio (2003) to improve social capital within communities. Since the work of Olson (1965), the issue of group size has remained complex and controversial on how it impacts collective action (see Wheelan, 2009), particularly on the issue of internal free-riding. Internal free-riding occurs when members abscond from fulfilling membership obligations, while they enjoy full membership benefits (Gadzikwa *et al*., 2007). The general conviction is that growth in group size is likely to increase the cost of monitoring and enforcing members' contributions, leading to high possibilities of internal free-riding (Isaac and Walker 1988).

Even though there is lack of consensus on the cut-off point between small and large group, it is believed that relatively larger groups affect the prospects for developing trust (LaPorta *et al*., 1997), cooperation of members (Bandiera *et al*., 2005) and increase transaction costs of monitoring group activities (Agrawal and Goyal, 2001). Nonetheless, Ortmann and King (2007a) contend that in small organizations characterized by singleness of purpose and homogeneous membership (in terms of individual members' interests), the control problem could be less serious than in heterogeneous organizations of similar sizes. Following Gadzikwa *et al*. (2007), the variable on group size effect was captured using the perception of members regarding the effect of increasing membership on possibilities of internal free-riding. A dummy variable was constructed, scoring one if the member believed increasing group size would not lead to internal free-riding, and zero otherwise. On the other hand, multiple-group affiliation was measured by the number of community organizations a member was affiliated to apart from the mushroom producing group.

4. RESULTS AND DISCUSSION

4.1 Determinants of collective action

In order to avoid the problem of assigning a greater weight to variables with larger variances in Table 2, PCA was applied using a correlation matrix (Krzanowski, 1987). The scores were tested for reliability using Cronbach's alpha, which was 0.61, implying that the responses were related enough to constitute a reliable composite measure (Winter

et al., 2005). Given the significance of the Bartlett's sphericity test ($p<0.01$), the null hypothesis that the eigenvalues, and consequently PCs were not independent was rejected. Hence, it was concluded that the correlation matrix was a reliable identity matrix, and PCA was appropriate for providing significant reductions in dimensionality. On the basis of having a reliable correlation matrix, the number of PCs retained for further analysis was, therefore, based on the size of variances of the PCs. This decision, otherwise known as the Kaiser criterion, is based on the assertion that if all elements of x_j′s are independent, then the PCs are the same as the original variables and all have unit variances (Jolliffe, 2004). Hence, PCs with eigenvalues less than one were considered to account for less variation in the original x_j′s (Koutsoyiannis, 1992) and were excluded, except three PCs as reflected in Table 3 below.

Table 3. Principal component analysis of the determinants of collective action for mushroom producing groups in Swaziland (N=70)

	Principal Components		
	1	2	3
Variables	Trust	Cooperation	Communication
T1	**0.5656**	0.0896	0.2316
T2	**0.5827**	0.1066	0.2029
Comm3	-0.2701	0.1903	**0.6013**
Comm4	**-0.3317**	0.2136	**0.5372**
Conf5	**0.3040**	**-0.3104**	**0.3330**
Comit6	0.0780	**0.3210**	**-0.3584**
Coop7	0.1835	**0.5620**	0.0212
Coop8	0.0814	**0.4385**	-0.0278
Satisf9	0.1371	**-0.4374**	0.1208
Eigen value	2.447	1.809	1.505
Variance explained	27%	20%	17%
Cumulative % of variance explained	27%	47%	64%
Overall Cronbach's alpha = 0.61			
Bartlett's test of sphericity chi-value = 223.621***			
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.569			

Note: Component loadings greater than ⎪0.30⎪ are highlighted in bold print
Source: Survey data (2011)

Applying the rule of thumb proposed by Koutsoyiannis (1992) for observations above 50, PC loadings greater than |0.30| were considered to indicate a strong association between the original scores and the PCs. These loadings are highlighted in Table 3 in bold print. The first component explained 27% of the variance and was found to be closely related to the level of trust that each member has for others. Dominant indicators of trust were T1, T2, Comm4 and Conf5. Trust is defined by Hansen *et al*. (2002:42) as "the extent to which one believes others will not act to exploit one's vulnerabilities for their own gains". The results in this case suggest that trust is closely related to the level of confidence that members have in others' abilities, trustworthiness of members, communication and lack of frequent conflicts. The negative sign for Comm4 indicates

that poor communication within the group is likely to reduce the level of trust among members.

The second PC, which explained 20% of the variance, represented cooperation. Cooperation, as defined by Toumela (1993), refers to a joint action performed by members who share a 'we attitude' for joint intentions. There were five dominant indicators of cooperation, namely, Conf5, Comit6, Coop7, Coop8 and Satisf9, indicating that collective action is likely to be enhanced, or at least maintained, if group members are committed, share ideas as they plan activities and fully participate in performing those activities. However, participation in group activities is likely to reduce if there are frequent conflicts among members and members are least satisfied with the group's overall performance. Communication characterized the third PC, which explained 17% of the total variance. Dominant indicators for communication were Comm3, Comm4, Conf5 and Comit6. The indicators suggest that lack of repeated conflicts and unrestricted exchange of information within the group, in a language that appeals to all members, is important for maintaining collective action. However, if members are less committed, there is a high likelihood that the level of interaction will decline.

4.2 Factors that influence collective action

Having identified trust, cooperation and communication as the key elements responsible for maintaining collective action, further analysis was conducted to identify factors that influence the three elements using a regression model. The motivation for the second stage of analysis is that knowing the determinants of collective action only, may not suffice for purposes of advancing policy recommendations. Policy makers need to be informed of the underlying factors which are likely to affect the sustainable management of informal mushroom producing groups. Drawing from field observations and evidence provided by past empirical studies, the three determinants of trust, cooperation and communication were regressed against the following variables, which are summarised in Table 4.

$$\text{Trust} = f(Z_a, C, M, \mu) \quad (2)$$

$$\text{Cooperation} = f(Z_e, T, M, \nu) \quad (3)$$

$$\text{Communication} = f(Z_i, T, C, \varepsilon) \quad (4)$$

where: Z_a = Membership in other organizations, gender, age, member category, religion and group size effect; C = cooperation; M = communication; Z_e = Group type, mushroom dependency, group size effect, gender, age, wealth, and household labour availability; T = trust; Z_i = Education, age, group type, member category, wealth, mushroom dependency and group size effect; μ, ν and ε are the corresponding error terms.

Table 4. Descriptive statistics of factors that influence collective action among mushroom producing groups in Swaziland (N=70)

Continuous variables						
Variable	**Description**	**Measurement**	**Total sample mean (N=70)**	**Mangweni mean (N=48)**	**Mbangweni mean (N=22)**	***t*-value**
AGE	Age of member	Years	53	57	52	1.303
MAN_EQUIV	Household labour availability	Man-equivalents	4.7	4.8	5.2	-0.443
ORG_MEMB	Multiple group membership	No. of other organizations	1	1	1	0.000
TRUST	Trust	PC_1	-1.4E-08	0.169	-0.370	1.702*
COOP	Cooperation	PC_2	-5.7E-08	-0.162	0.354	-2.673**
COMM	Communication	PC_3	2.8E-08	-0.492	1.074	-5.558***
Categorical variables						
Variable	**Description**	**Measurement**	**% of total sample (N=70)**	**% from Mangweni (N=48)**	**% from Mbangweni (N=22)**	**χ^2-value**
GENDER	Gender of member	1=female	74.3	68.8	86.4	2.450
		0=male	25.7	31.3	13.6	
FOUND_MEMB	Member category	1=founding member	41.4	29.2	68.2	9.463***
		0=non-founding member	58.6	70.8	31.8	
WEALTH	Household wealth status	1=wealthy	15.7	14.6	18.2	0.147
		0=poor	84.3	85.4	81.8	
RELIGN	Religious affiliation	1=Christian	71.4	66.7	81.8	1.697
		2=Muslim	0	-	-	
		3=Hindu	0	-	-	
		4=other religious affiliations	0	-	-	
		5=no religious affiliation	28.6	33.3	18.2	
GRP_SIZE	Group size effect	1= If member feels increasing membership would not induce internal free-riding tendencies	52.9	31.3	100	28.615***
		0=if member feels increasing membership would induce internal free-riding tendencies	47.1	68.8	0	

Table 4 continued…..

Ordered variables						
Variable	**Description**	**Measurement**	**Total sample Mode (N=70)**	**Mode Mangweni (N=124)**	**Mode Mbangweni (N=187)**	***z*-value†**
FOOD	Mushrooms as source of food	Rank	2	2	4	-2.140**
INCOME	Mushrooms as a source of income	Rank	12	12	13	-2.836***
EDUC	Education level of member♠	Highest level of education attained	3	3	3	4.01⇑

Notes:

*, **, *** represent 10%, 5% and 1% levels of significance, respectively.

† Values were computed using Wilcoxon signed rank test.

♠1= no education; 2 = adult education; 3 = primary education; 4 = secondary education; 5 = high school; 6 = college/vocational; and 7 = university.

⇑ denotes a chi-square value.

Source: Survey data (2011)

The average age of members was 53 years, and most (74%) were women. About 41% attained primary education and only 14% completed high school, while none received tertiary training. About 47% of the members perceived a positive correlation between increasing group size and the likelihood of internal free-riding. Of the 47% who are not in favour of increasing group size, none were from Mbangweni, while 69% constituted respondents from Mangweni who produce under one roof. Over 45% of the respondents reported to be affiliated to other community organizations, besides being members of mushroom producing groups. Mbangweni had over 51% of its membership composed of founding members compared to Mangweni, where about 52% reported to have joined the group at a later stage, perhaps after seeing benefits or being encouraged by friends and neighbours. Using cluster analysis, two wealth categories were identified where only 16% of the respondents were classified as "wealthier" while the rest (84%) were relatively poor. When asked to declare their affiliation with different religious groups, about 71% of the respondents identified themselves as Christians, and the remainder (29%) had no religion-based affiliation. Among the Christianity groups reported, the Zionist sect was found to be dominant (66%), followed by Methodist (10%). The findings on religion are consistent with Rautenbach (2008).

4.3 Endogeneity test for trust, cooperation and communication

In the absence of empirical evidence, different authors have indicated inter-relationships between some dependent variables for the regression model. For instance, Tuomela and Toumela (2005) believe there is a two-way relationship between trust and cooperation, while Yamagishi *et al*. (2005) found cooperation to be a determinant of trust. Jones and George (1998), on the other hand, contend that trust is a function of cooperation and not the other way round. Given the above arguments surrounding the nature of relationships

between the indicators of collective action, equations (2), (3) and (4) were, respectively, transformed into the following three equations (5, 6 and 7) in order to perform an exogeneity test (see Gujarati and Porter, 2009 for details on the procedure).

$$\text{Trust} = \alpha_0 + \gamma Z_a + \alpha_2 C + \alpha_3 M + \delta_2 \hat{C} + \delta_3 \hat{M} + \mu \quad (5)$$

$$\text{Cooperation} = \beta_0 + \theta_1 Z_e + \beta_1 T + \beta_3 M + \delta_1 \hat{T} + \delta_3 \hat{M} + \nu \quad (6)$$

$$\text{Communication} = \xi_0 + \lambda_1 Z_i + \xi_1 T + \xi_2 C + \xi_1 \hat{T} + \delta_2 \hat{C} + \varepsilon \quad (7)$$

Using the *F*-test, the null hypothesis that $\delta_1=\delta_2=\delta_3=0$ was rejected suggesting that trust, cooperation and communication could not be treated as exogenous variables in the three-equation model. The results were as follows: Eq.5 F-value = 7.68 ($p<0.01$); Eq.6 F-value = 4.15 ($p<0.01$); and Eq.7 F-value = 7.85 ($p<0.01$). A second test for exogeneity was performed such that where T, M and C appeared as independent variables in equations 5, 6 and 7, they were proxied by T_2, Comm_3 and Coop_7, respectively. This was done in order to avoid challenges associated with regressing orthogonal variables against one another (PC against another PC). The proxy variables were picked based on their comparatively high component loadings for each respective PC (see Table 3). Using the *F*-test, the null hypothesis that $\delta_1=\delta_2=\delta_3=0$ was again rejected, confirming that trust, cooperation and communication are not exogenous variables. The second estimation results were as follows: Eq.5 F-value = 13.87 ($p<0.01$); Eq.6 F-value = 3.55 ($p<0.01$); and Eq.7 F-value = 10.34 ($p<0.01$). In view of the exogeneity test results and considering that the equations were all identified, the analysis was consequently conducted using simultaneous equations (3SLS) instead of Ordinary Least Squares (OLS) as the latter would have produced biased results. The analysis was performed using STATA 11.

4.4 Regression results

Although the equations have varying degrees of R^2, the chi-square values indicate that all three equations are statistically significant ($p<0.01$) with no signs of multicollinearity among explanatory variables and no heteroscedasticity (see Table 5 below). The results of the 3SLS model suggest that founding members and those with multiple group affiliations have a high level of trust towards other people. This implies that interacting with people from different backgrounds shapes members' behaviour and generates the experience of working in group formations through trust. As such, multiple or diverse group affiliation enhances social interaction and improves trusting attitudes. The results also indicate that demographic attributes (age and gender) are significant indicators of social capital (trust and cooperation), and by extension, collective action. While other studies (e.g., Bolin *et al*., 2003) have found a negative relationship between age and social capital, the results in the present study suggest that older people are relatively more accommodative towards others, and through trust they are able to participate in collective action.

Table 5. 3SLS Regression results of factors that influence collective action in mushroom producing groups from Swaziland

Variable	Trust				Cooperation				Communication			
	β	**Std. error**	***z*-value**	**VIF**	***β***	**Std. error**	***z*-value**	**VIF**	***β***	**Std. error**	***z*-value**	**VIF**
CONSTANT	-1.225	0.874	-1.40		-4.438	1.797	-2.47**		-2.083	1.306	-1.60	
GROUP_TYP					-0.153	0.442	-0.35	2.73	0.514	0.298	1.73*	2.34
ORG_MEMB	0.488	0.163	2.99***	1.23								
GENDER	0.610	0.293	2.08**	1.38	0.790	0.357	2.21**	1.67				
AGE	0.021	0.009	2.46**	1.17	0.010	0.010	0.96	1.15	0.002	0.007	0.25	1.10
EDUC									0.018	0.089	0.21	1.40
FOUND_MEMB	0.716	0.261	2.74***	1.38					0.275	0.215	1.28	1.46
WEALTH					0.373	0.365	1.02	1.13	-0.441	0.268	-1.64*	1.17
RELIGN	1.195	0.283	4.22***	1.37								
GRP_SIZE	-0.399	0.284	-1.40	1.69	-0.338	0.393	-0.86	2.50	1.341	0.252	5.31***	1.93
FOOD					0.652	0.176	3.71***	1.39	-0.178	0.135	-1.32	1.57
INCOME					-0.069	0.135	-0.51	1.64	0.059	0.097	0.60	1.63
MAN_EQUIV					-0.062	0.052	-1.19	1.13				
COOP_7	0.240	0.196	1.22	1.26					0.223	0.177	1.26	1.61
T_2					0.056	0.087	0.64	1.19	0.158	0.067	2.35**	1.35
COMM_3	-0.726	0.163	-4.45***	1.67	0.643	0.190	3.37***	1.87				
Observations	70				70				70			
R^2	0.65				0.36				0.59			
χ^2	133.89***				48.86***				108.99***			
Breusch-Pagan/ Cook-Weisberg (1df)	1.07 Probability = 0.3009				0.22 Probability = 0.6379				0.01 Probability = 0.9973			

Note: *,** and *** represent statistical significance at the 10%, 5% and 1% levels, respectively

Source: Survey data (2011)

With the descriptive results indicating over 70% of the total membership being women, the regression results imply that besides holding high level of trust towards other members, women feel more comfortable and find it relatively easier to cooperate if they dominate the group in terms of numbers. Such observations are more prevalent in African countries like Swaziland where cultural and gender norms are not in favour of women (Katungi *et al*., 2008). As noted by Peter *et al*. (2008), Swaziland has a very low Gender Empowerment Index, indicating the presence of structural and traditional barriers that prevent women from participating and contributing fully to national development.

Founding members have a relatively high trusting attitude towards others. Despite the lack of literature linking these two variables, in the context of this study, founding members are categorised as collective action innovators, implying that they are relatively more accommodating. In establishing the mushroom enterprises, these members typically faced financial and other opportunity costs while maintaining a future-oriented behaviour to produce a highly perishable product in an environment characterized by risk and uncertainty of outcomes and rewards. Allowing other members to join at a later stage, perhaps after experiencing some positive results, could be attributed to founding members' trusting attitudes towards new members, expecting them to complement their efforts rather than exploit the collective venture for selfish gains. As such, organizations having a greater proportion of founding members are likely to have relatively high level of trust and perhaps cooperation in performing group activities.

Religious affiliation was found to enhance trusting attitudes among group members. While there was not much diversity observed in religion, as more than 70% of members identified themselves as Christians, the results confirmed Sosis' (2005) findings that people in an organization tend to trust individuals who are more 'similar' to them in terms of belief and social affiliation. This implies that socio-cultural homogeneity has a positive effect on collective action as people who share similar beliefs and social norms are able to make and enforce decisions without major disagreements. Once the element of trust has been created, it becomes easier for members to cooperate and share information as they perform collective duties.

An important observation from the regression results is that members who depend on mushrooms for food tend to cooperate with others in planning and performing group activities. The results imply that the more mushrooms become important for household food security, members will have incentives to remain in the group and work together to ensure that group aspirations become a reality. However, the coefficient estimate for wealth was negative, suggesting that wealth inequality is likely to reduce the exchange of information among members. Members who are comparatively wealthier are less likely to share information equally with others. This could possibly be influenced by the availability of exit options for the comparatively wealthy members and possibly because they have less to gain from the collective initiative. With communication being an important factor for minimising social distance between group members and enhancing cooperation, such disparity could see members interacting less frequently, reduce the level of trust and make members feel less encouraged to participate in group activities, including decision making. Consistent with the PCA results, poor communication is more

likely to reduce the level of trust, while high level of communication significantly improves cooperation.

Members producing in groups that operate using model B are more likely to communicate better than their counterparts who produce using model A. This was least expected considering that members affiliated to groups using model B only perform selective activities as a unit (see Section 3.3). However, considering that the mode of operation is determined by the members themselves, the results could be a reflection that groups operating using model B provide a conducive environment for members to express their views freely. It is highly possible that even the decision to manage individual houses was arrived at after extensive internal consultation with the intention being to maximise individual gains while minimising possibilities of free-riding.

Regarding the perception of members on the effect of group size on internal free-riding, the results indicate that members who feel increasing membership will not necessarily lead to possibilities of internal free-riding are likely to remain loyal to the group and share information with others. These results suggest that when members are brought together by singleness of purpose and share similar interests, the size of the group becomes less of a concern than when members are inclined to use the group for selfish gains. Although these findings are in contrast to Gadzikwa *et al*. (2007), the implication is that members' perceptions and attitudes play a significant role in influencing their behaviour and action within the group.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

The study aimed to identify the key factors that unify members of informal groups engaged in mushroom production in Swaziland. In contrast to formal organisations, which are regulated by law, informal groups are fully autonomous and not regulated by any legal instrument in Swaziland. Based on a conceptual framework that uses social capital dimensions to study collective action, trust, cooperation and communication were identified as the key elements responsible for maintaining close relationships between members of informal groups engaged in mushroom production. Further analysis indicated that trust is positively influenced by gender, age, religion and proportion of founding members. Cooperation was found to be positively influenced by gender, members' dependence on mushrooms for food and communication. Communication, on the other hand, was found to be positively influenced by the level of trust and member cooperation, but negatively influenced by members' wealth disparity. The empirical evidence indicates that members from communities characterized by positive cognitive social capital are most likely to engage in collective action in an attempt to improve their livelihoods. However, the sustainability of the groups' internal activities will largely depend on whether members abide by the rules, roles and procedures they develop in formulating the groups. Thus, social capital has a fundamental role to play in creating and sustaining agricultural collective initiatives for rural-based smallholder producers. The study, therefore, recommends that informal groups developed voluntarily by community

members should be encouraged and embraced as an important element of Swaziland's development agenda.

With reference to mushroom production, the study recommends that informal groups should consider using model B (refer to Section 3.2 for details) for the production phase of the enterprise, with some modifications in the marketing phase. Some of the major benefits of adopting model B include buying inputs in bulk, preparing the substrate material and spawning substrate bags (planting) as a group, something which enables the members to reduce their average input costs substantially. In addition, allowing members to manage their individual houses improves their knowledge of the enterprise and management capacity, while at the same time it reduces the likelihood of internal free-riding. However, instead of marketing independently (which is what model B currently promotes), the study recommends that producers should consider the option of collective marketing, which could be coordinated similarly to the procurement of inputs and preparation of substrate material. Marketing as a unit could be easily coordinated considering that all members commence the production cycle at the same time. Collective marketing, would, among other things, enhance farmers' chances of obtaining economies of scale, accessing lucrative markets and increase their bargaining power in the industry. This would also enable buyers to reduce the number of small-scale transactions they engage in with individual farmers; hence, allowing the same volume of business to be concentrated in a smaller number of relatively larger and more secure transactions.

In order to sustain the existence of mushroom producing groups and, by extension, other informal organizations intended for rural development, substantial investment should be made towards augmenting the strength of social capital. This is an area where development agencies could probably play a significant role in promoting autonomous smallholder collective action, without interfering with the groups' internal activities. In particular, the study recommends that mushroom producer groups should be granted institutional support in the form of training (e.g., in business management), which would enable informal groups to improve their productivity and competitiveness.

Notes:

1 The six countries include Angola, Malawi, Mozambique, Namibia, Swaziland and Zambia.

2 The categorical variables used to arrive at the wealth clusters for the sample were classified as follows:

a) Energy for lighting: 6= electricity, 5=solar, 4=generator, 3=handigas, 2=paraffin and 1=candles.
b) Energy for cooking: 6= electricity, 5=solar, 4=generator, 3=handigas, 2=paraffin and 1=wood.
c) Source of domestic water: 7=own borehole, 6=standpipe within household, 5=harvested water within household, 4=community standpipe/borehole, 3=well, 2=dam, 1=river.

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