

Social Networks Stimuli: A Double Dekker Semi-Partialling Multiple Regression Quadratic Assignment Procedure (Mrqap) Approach: Case of Small-Scale Farmers in Kenya



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Abstract

Markets in Kenya are characterized by existence of information asymmetry among the parties involved. Like any other developing country, Kenyan markets involves high transaction cost especially in search of quality inputs and market information. These market imperfections inhibits a fair competition among the actors. This consequently has resulted to unfair trade where the farmers find themselves in a disadvantaged edge hence becoming difficult to transform into commercialization. This study examined the social network stimuli on information acquisition on banana production and marketing information among small holder farmers in Murang'a county. Double Dekker Semi-Partialling Multiple Regression Quadratic Assignment Procedure (MRQAP) approach in Ucinet was used in the analysis. An n by n matrix of the farmers who rely on 'informal networks' formed the dependent variable that was subjected to the test of hypothesis. The independent variable enters the QAP regression as matrices where in all the variables, the rows are similar (egos) while the columns capture the variables' attributes. All the data were coded in binary form to generate an adjacency matrix. Among the variables analyzed, the study indicates that group membership, trade, friendship and gender indicates a positive embedding to social ties.

Keywords: Social Network Stimuli; Ucinet; Informal Networks; MRQAP

Introduction

Due to market imperfections, sourcing of hybrid and quality planting materials as well as market information for farm products in the country involves a high level of transaction costs. The government has tried to bridge these imperfections by providing extension services to the farmers. According to Odongo [1], the ratio of extension officers to farmer in Kenya is 1:1093 against the recommended 1:400. It is due to this ratio that farmers have designed other means to which they can supplement the services offered by agricultural extension officers. Human beings in nature are interactive creatures. These interactions among individuals in a given society enriches the human capital among the actors. Social network is therefore an important platform through which valuable information can circulate with ease among the actors. Owing to this, Cassi et al. argues that social networks can therefore be used as avenues by which farmers in developing countries can use to commercialize their productions.

A network is formed when a finite number of nodes/actors are interconnected by edges or ties. Actors in the net represent entities

such as individual farmers and traders. These nodes represent different and distinct levels of centralities in the net. The ties represents the relationship between a pair of actors. Ties can either be friendship ties, informational ties, advice ties, and trading ties. According to Renard and Guo [2], social network is a major social capital embedded in personal relationships among actors. This therefore means that an actor in a network can easily disseminate his knowledge across the actors with ease. This therefore means that a resourceful network has prospects to improve the productivity as well as the welfare of households and the overall society. This study conceptualized the unit of analysis as the relationship between the variables and an $n+n$ matrix for those farmers who rely on other sources other than government extension officers. In social network analysis, actors can be connected on the basis of similarities, group memberships, social interactions and social relations [3].

It's therefore on this basis that these farmers' network conceptualized households as often participating in networks that reduces market barriers and the ease to acquire quality inputs

therefore enhancing the probability of banana commercialization. Social network data are dyadic in nature in the sense that they refer to the relations between pairs of actors. Since the unit of analysis is a dyadic in nature, Krackhardt [4] argues that network observations are independent of one another and therefore makes the standard regression techniques not viable for analysis of this kind of data. To examine the extent to which small holder farmers are embedded to social networks, Double Dekker Semi-Partialling Multiple Regression Quadratic Assignment Procedure (MRQAP) approach in UCINET was used [5]. The farmers' n-n matrix was regressed against the network variables. According to Tsai [6] interpretation of the results from such an analysis is interpreted as if it was an Ordinary Linear Regression. The advantage of MRQAP is that it's effective in the analysis of the correlation between network and non-network data.

Study Area and Sampling Technique

The sample unit for this study consisted of smallholder banana farmers drawn from Kahuro Sub-County in Murang'a. County which were purposively selected. This was due to the intensity of banana farming in the area.

The required sample size was determined by proportionate to size sampling methodology (Anderson et al., 2007) [7].

$$n = \frac{pqz^2}{E^2} \dots\dots\dots (1)$$

Where n = sample size, p = proportion of the population under banana farming, q = 1-p, z = confidence level ($\alpha = 0.05$), E = acceptable/allowable error. Since the proportion of the population was not known, p=0.5, q = 1-0.5= 0.5, Z = 1.96 and E = 0.075. This resulted to a sample size of 171 Households. These households were randomly selected among small scale banana farmers in the sub-county.

Results and Discussions

The basic linear model for square matrix data considered in this study was:

$$z = \beta X + \gamma Y + \dots + nN + \varepsilon$$

Where Z is an n × n matrix for farmers who rely on fellow farmers, β , γ and n are scalars, X, Y and N are an n × n matrices

that captures the stimulators to networking. The diagonals of the matrices were ignored since they capture an actor's relation with him/herself. The null hypothesis was $H_0: \beta, \gamma, n = 0$. The matrices X, Y and N are not assumed to be independent.

Stimulators to Social Networking Among Banana Farmers

In this section, the MRQAP has been used to test the hypothesis that networking among banana farmers has no relationship with gender, friendship, neighborhood, fellow farmers, farmers who are also market traders, education, and similarity in group membership; henceforth referred to as informal sources in the context of this study. An n by n matrix of the farmers who rely the informal sources form the dependent variable. In this procedure, Ucinet software was used to analyze the extent to which informal sources act as stimuli towards sourcing of information and inputs by the farmers in the study area.

Double Dekker Semi-Partialling MRQAP Results

The point of focus in this section is the p-values which meets the QAP threshold of statistical significance; i.e. farmers who considered their age mates, neighbors, farmers of their gender, those whom they are in the same membership groups and farmers who are banana traders as the sources of information and planting materials. The dependent variable is only the farmers who rely on 'informal sources' of information as conceptualized in this paper. The regression coefficients in the Table 1 shows a positive relationship between farmers in the same age group and the ease to have social ties. Friendship among the actors in the network has proven to have a positive relationship with social ties. ($\alpha=1.175$ p=0.0772) Farmers in the same physical neighborhood share resource and information 0.24times more often than those people who are not neighbors with a probability 0.412% that this will occur by chance. On the other hand, banana farmers get information from farmers who are also banana traders 1.089 times more often with non-traders with a probability of 1.99% that this is by chance. Banana farmers network among the same gender 0.974 times more often with a probability of 0.5% that this is by chance. Finally, farmers in the same group/membership network 1.77 times among themselves with a probability of 0% that this is by chance.

Table 1: Coefficients of MRQAP regression.

Network Affiliations	Standardized coefficient - α	P-value	Standard error
Age	1.00313*	0.0806	0.01898
Education	0.1925	0.36816	0.00511
Friendship	1.0175*	0.07723	0.01493
Neighborhood	0.2368*	0.00412	0.01039
Gender	0.9714***	0.00498	0.06529
Same group	1.77074***	0.00053	0.03858
Trader	1.08899**	0.0199	0.04229
Intercept	0.24929	0.0000	0.0000

Note: Pseudo R²= 0.57; ***, **, * significant at 1%, 5% and 10% respectively.

To ascertain that the above output were not merely by chance, QAP correlation test for significance on the same data was performed to permit more discussion. In QAP correlation, each variable was measured using a different matrix in which all matrices feature the same node but have different relations in the cells representing a different idea about how the nodes could possibly relate to each other. This study analyses how networking among banana farmers

is correlated with the independent variables. Essentially, it tries to capture whether similarities in various aspects breeds or acts as a pull factor towards networking. What it does is trying to explain how farmers of the same gender, same education level, same group, traders, friendship, age mates and neighborhood breed connections. The horizontal variables are a copy of the vertical ones (Table 2).

Table 2: QAP Correlation.

	Age<45yrs	Education	Friendship	Gender	Neighbor	Network	Same group	traders	P-Value
Age<45yrs	1.000	0.003	-0.012	0.001	-0.008	0.01	0.012	0.006	0.182
Education	0.003	1.000	0.006	0.032	-0.009	0.15	0.002	0.006	0.118
Friendship	-0.012	0.006	1.000	0.001	-0.038	0.87	0.102	0.303	0.005***
Gender	0.001	-0.032	0.001	1.000	-0.003	0.28	0.001	0.008	0.035**
Neighbor	-0.008	-0.009	-0.038	0.003	1.000	0.42	0.018	0.055	0.159
Network	0.01	0.15	0.87	0.28	0.42	1.00	0.57	0.86	0.000
Same group	0.012	0.002	-0.102	0.001	-0.018	0.57	1.000	0.148	0.012**
Traders	0.006	0.006	0.303	0.008	0.055	0.86	0.148	1.000	0.085*

There is a strong positive correlation (0.87) between friendship and networking. The correlation coefficient has a p-value of 0.005 which far meets the QAP correlation test of significance. This shows that it is not by chance alone that banana farmers in Kahuro division considered network partners as friends. In the network alliance, friendship is a reciprocal variable and therefore all farmers in their particular networks considered each partner in their networks as friends and this is a critical component in the process of sharing resources and information among participants in a network. These findings are relevant for understanding the role of friendships in a given society. It is undeniable that people select and influence each other; thus, social networks are powerful tools for disseminating information especially when the central actors in the net are information banks [8,9]. The study considered a heterogeneous sample selection in terms of gender composition. The correlation coefficient between networking and gender is 0.28. This is a weak positive correlation which is statistically significant at 0.035. Male farmers tend to network with male farmers while female farmers tend to network with their female counterparts. This is induced homophile where birds of the same feathers flock together. However, there is a slight diversity of gender composition in the network as indicated by the size of the correlation coefficient. This ensures that there is a perfect mix in terms of information generation. Diversity in any institution is critical to ensure that there is a resource mix in the network and therefore ensuring a complete informational cycle within the net since male and female are endowed differently.

Previous studies have attributed group membership as a proxy for social capital where members of a group take advantage of group formation to increase their bargaining power. In this study, a group is defined as any form of informal organization among actors. In other words, actors who are members to any group were considered in this study. There is a positive correlation of 0.57 (0.012). The argument in this is that people in the same group enjoy similarity in resources and information and therefore

members of a common group tend to network with non-similar others as much as they interact with themselves. Fundamentally, this means that banana farmers enjoy diversity of information and resources and therefore chances of an alter in this network lacking the information or resources that an ego farmer needs is very low. Banana farmers tend to network with trader (farmers who are also traders) more often in search of information. This is indicated by the strong correlation coefficient of 0.86(0.085). This means that as much as the farmers rely on each other to share resources, a credible number rely on traders to get information. This concurs with the findings by Fafchamps et al. [10] who concluded that farmer relationships with other traders will, among other things; helps economize and reduce on transactions costs. Relationships and social networks may thus enable agents to economize on transactions costs even though they would probably fail to achieve the same level of aggregate efficiency as perfect markets. Of course, there may exist yet other omitted unobservable that may bias the results. In the absence of panel data, these effects can unfortunately not be controlled for.

Conclusion and Recommendations

To identify motivations towards farmers networking, gender, group membership and friendship were found to be influential in dependence on farmers' network. This ensures that there is a perfect mix in terms of information generation. Farmers who were relying on fellow farmers for information were found to possess a high degree of commercialization. This is attributed to the fact that networking among the farmers is a form of human capital on its own and is able to minimize transaction costs involved in farming and marketing which has always been identified as a barrier to agricultural commercialization. It's clear that the gap of farmers to extension officers is widening each and every day as the government embarks on food security. It's therefore paramount that the governments in developing economies become cognizant on the role played by social networks in supplementing the services

offered by extension officers. The most central actors in a network should be identified and equipped with modern technologies to ease the dissemination of modern farming technologies.

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