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Patterns of access and utilization of output markets by emerging farmers in South Africa: Factor analysis approach

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Based on the data collected from 500 emerging farmers that were randomly selected from nine provinces of South Africa, this study determines the patterns of access and utilization of output market by emerging farmers in South Africa. Factor analysis was applied on twenty components of output markets in South Africa. The results show that there are patterns that are observable in terms of access and use of output market by emerging farmers. The most commonly used output markets by emerging farmers are family and friends, the fresh produce markets as well as public stores. The study reveals that farmers tend to sell their produce to public stores as most of these stores are close to the farming communities. Friends and family also provide an important market outlet for produce by emerging farmers. Improving road conditions and transport services in rural areas will not only improve accessibility of external markets, but will also improve accessibility of local output markets.

Key words: Emerging farmers, factor analysis, market access, output market, South Africa.

INTRODUCTION

A major challenge for sustainable agricultural development in South Africa is the limited ability by previously disadvantaged farmers (e.g. emerging farmers) in accessing viable local and international markets for their produce. Despite the existence of policies that facilitate more liberalized, deregulated market for agricultural products, there are market related constraints that are faced by emerging farmers which limit their ability to enter mainstream commercial agriculture.

Emerging farmers in South Africa emanate from the group of smallholder farmers, who were previously excluded from the mainstream of the economy. They now constitute a major part of what is referred to as the second economy in agriculture. They include beneficiaries of land reform programmes and new entrants who took advantage of opportunities to enter into agriculture. While these smallholder farmers provide livelihoods to some 20 million people, they still face a number of difficult condi-

tions, for example, poor infrastructure. According to Stats SA census (2001), 65 – 90% of rural households (depending on location) lack access to decent roads, while 2.4 million households have no access to nearby telephone trunk lines or cell phone connections. According to the above study, about 58 and 51% of the rural households have access to piped water and electricity respectively.

A survey conducted by the NERPO (National Emerging Red Meat Producers Organization) among its members has shown that farmers are unable to gain access to finance because institutions such as the Land Bank require land held in title as collateral. According to NERPO, access to land and farm infrastructure remain the main constraints to the commercialization of emerging farmers (Blom, 2006).

Output market infrastructure is the capital stock that provides the market for output produced by farmers. Thus accessibility and usage of output market by emerging farmers in South Africa are two important factors that determine the development of this group of farmers. Also the relationship among various marketing channels that emerging farmers use is another detrimental factor for the

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development of emerging farmers. The objectives of this study are of two fold; firstly, to identify the market channels that are available to emerging farmers, and, secondly to determine how emerging farmers' access and utilise these output markets in South Africa.

Factors affecting the output market access of emerging farmers in South Africa

Access to output markets, ranging from small village-level markets to sophisticated export processors, is the key for small farmers to earn more from the sell of their produces. Poor farmers in remote areas appear to have limited access to output markets for their products. However, by assessing transport costs and focusing on multiple high-value storable crops, opportunities emerge to create output market linkages with a rate of return that is very attractive to poor families (International Development Enterprises, 2008).

A study by Mathye et al. (2000) addresses the choice of marketing channels for smallholder farmers producing bananas and mangoes in some areas of the Limpopo Province and found that not all farmers sell their products. Those who do sell tend to use different channels such as a fresh produce market, an *achaar* (a product made of mango) market and direct sales to consumers. Different factors affect the choice of the market channel, but the study found that problems of transport, searching for markets and education tend to influence participation (Makhura, 2001).

According to Heinemann (2002), rural people in Africa, especially the poor, often say that one reason they cannot improve their living standards is because they face difficulties of accessing markets where they can obtain agricultural inputs and consumer goods and sell the produce that they grow. A major reason why even those farmers who can produce a surplus remain trapped in the poverty cycle is lack of access to profitable markets. All too often farmers are forced to sell to the buyer of convenience at whatever price that buyer dictates (IITA, 2001).

In addition, most of the literature related to smallholder agricultural marketing, e.g. Dorward et al. (1998), Freeman and Silim (2001), IFAD (2003), Jayne et al. (2002), Kherallah and Kirsten (2002) and Killick et al. (2000), reiterates that the problem of market access is linked to the following constraints: price risk and uncertainty, difficulties of contract enforcement, insufficient numbers of middlemen, cost of putting small dispersed quantities of produce together and the inability to meet standards. Other problems related to physical market access like physical infrastructure include roads, market facilities, power and electricity. In rural areas, for example, small holders are often geographically dispersed, roads and communications are poor and the volumes of business are insufficient to encourage private sector service provision.

According to IITA (2001), to overcome these problems,

farming communities have formed cooperatives, collective marketing associations, and other mutual alliances to increase their buying and selling power in the market place. Larger commercial farmers have also been active, forming mutually beneficial alliances with farmers supplying marketable products at agreed prices. Clearly, it is only by such means that most developing country farmers can move from a poverty cycle to an income cycle, and begin to make a real contribution to overall economic development.

One of the major constraints to the growth of small holder agriculture in African countries is high transaction costs (Machethe, 2004), largely attributable to poor infrastructure. This situation is no exception in South Africa, particularly the former homelands (DBSA, 2005). A large proportion of rural households continue to lack access to basic services (Stillwell and Makhura, 2004).

Access to road transportation determines households' demand for production and consumption goods and services (Wanmali, 1992). If agricultural inputs and output markets are more accessible rural households will tend to use these services more, leading to improved productivity (Kamara, 2004). Deficiencies in rural infrastructure services result in poorly functioning domestic markets with little spatial and temporal integration, low price transmission, and weak international competitiveness (Pinstrup-Anderson and Shimokawa, 2006). Economic activities in most rural areas tend to be concentrated around areas where there are banks, postal services, retail outlets and suppliers of inputs.

Poor road conditions, high transport costs and distant markets have been identified as factors that hamper improved market access for emerging farmers in South Africa (Makhura and Mokoena, 2003; Nieuwoudt and Groenewald, 2003), and also contribute towards failing input markets. Factors that determine access to input and output markets include distance to the markets, the state of the roads, the cost of transportation and the frequency of visits to these markets.

Government policies and emerging farmers in South Africa

After 1994, South African agricultural policy expanded its focus from the fully developed, modern, commercial farming sector to include the emerging farming group found in traditional tribal areas. Government institutions like the Department of Agriculture, the Land Bank and the Agricultural Research Council hastened to revamp, cater to the needs of this most needy group. A second big change in agricultural policy came in September 1997, when the New Agricultural Products Marketing Act swapped a controlled marketing economy for a free market situation (Germishuis, 1998). South African agriculture is highly dualistic with a small number of commercial operations run predominantly by white farmers and large numbers of subsistence farms run by black farmers.

Most agricultural development institutions are still learning how to deal with the special circumstances and needs of emerging farmers. The result is that the National Department of Agriculture has all but lost direct control over the instruments and institutions with which it could possibly influence agriculture (DBSA, 2005).

Improving market access for disadvantaged communities involves a range of aspects, from ensuring that they produce products of the right quality acceptable to the market, to physical functions such as providing them with infrastructure and information. Thus, improving market access requires a range of interventions by the state. These include the provision of marketing infrastructure (depots, auction pens, telecommunications infrastructure, etc.); information (on prices, markets, buyers, grades, etc.); extension (technical production issues, quality requirements, financial and market knowledge) and research (on a wide range of issues).

Inadequate physical infrastructure in rural areas, particularly in the former homelands, remains a major obstacle to such growth in South Africa. Despite government initiatives to improve the quality of infrastructure in the rural areas through programmes such as the Community Based Public Works Programme, the Consolidated Municipal Infrastructure Programme, and the Poverty Relief and Infrastructure Investment Fund, the impact on the lives of many rural people has been limited (Everatt and Zulu, 2001). Large investments were made in smallholder irrigation schemes in the former homelands, but many of these schemes are not performing optimally because of the withdrawal of state support (Machethe et al, 2004).

According to the DBSA (2005), it would be hard to argue that government policies and programmes to support smallholder agriculture in South Africa are sufficient when the current state of policies is either inimical to these farmers' interests or ignores them altogether. If agriculture is to make more of a contribution to poverty alleviation, the incomes of smallholder farmers will have to be raised, which requires promoting the growth of smallholder agriculture.

RESEARCH METHODOLOGY

Data collected from a sample of 500 emerging farmers across the nine provinces of South Africa in the year 2005 by the Development Bank of Southern Africa (DBSA) and the Marketing Surveys and Statistical Analysis (MSSA) was used in this study. From each province emerging farmers were identified first and then randomly selected. In the study emerging farmers were defined as those participating in the output market. The information was collected through a structured questionnaire administered on individual head of households.

The econometric model

The econometric model used in this study is Factor Analysis (FA). According to Johnson and Wichern (1992) and Hair et al. (1995) the essential purpose of the factor analysis is to describe the covariance relationships among many variables in terms of a few underlying,

but unobservable, random quantities called factors and interpreted through weights of the variable called factor loadings organized in a matrix of factor loadings. The factor analysis model is organized in such a way that all variables within each factor are highly correlated among themselves but have relatively small correlations with variables in other factors (Gorsuch, 1983). Typically, factors used for further analysis should contain unique variables. However, such a restriction can be relaxed when the results are just intended for understanding the pattern of relationship. Factor analysis is a generally accepted method of answering the basic question of whether or not output markets are located individually or in some cluster (combinations). The procedure is applied in this study to identify dimensions in which these services are distributed. The factor model can be expressed in matrix form as:

$$\mathbf{x} = \mathbf{A}\mathbf{f} + \mathbf{e}$$

Where \mathbf{x} is the vector of n observable variables; \mathbf{f} is the vector of m unobservable factors; \mathbf{A} is called the loading matrix of the order $n \times m$; \mathbf{e} is the error vector of $n \times 1$.

The aim of the factor analysis is to account for the correlation of the covariance between the responses variables in terms of a smaller number of factors. This study attempts to determine the pattern of relationships among location of output market for emerging farmers. Also this study uses principal component extraction method, which involves no assumptions about unique or error variance in the data. The principal component method is appropriate where the objective is to ensure maximum ability to explain variance of observed variables (Mulaik, 1972; Jackson, 1991).

To determine the number of factors that have to be retained, the study uses the Kaiser criterion of retaining Eigen values greater than one (>1), and also selects factors with high factor loadings scores ± 0.4 or greater. Table 1 shows the variables that are included in the analysis.

RESULTS AND DISCUSSION

Access and use of output market

The study identified three main types of output markets available to emerging farmers and these were the family and friends market, public market and local fresh produce market. Access and use of output market is categorised into the percentage of produce to the output market, distance to the output market, tarred road condition to the output market as well as gravel road condition to the output market. Table 1 below shows the descriptive statistics of the access and use of output market.

The results show that about 57% of the produce produced by emerging farmers is sold to the family and friends market as well as local fresh produce market while 52% is sold to the public stores. Whilst some of the farmers use more than one channel of marketing, not all produce was sent to the market, but some was retained for home consumption.

The distance to the output market is an important factor since the interaction of the farmers with the output market is crucial in making information available. Long distances to the market can be a disincentive to farmers who want to commercialize. Compared to other output markets, the local fresh produce markets is located furthest to a typical emerging farmer. That is, a typical emerging farmer is located 19 km away from the local fresh produce market

Table 1. The descriptive statistics of the access and use of output market.

Variable	N	Mean	Min	Max
% Of produce to family and friends	312	56.5	2	100
% Of produce to public stores	105	51.9	5	100
% Of produce to local fresh produce market	165	56.7	5	100
Distance to family and friends market (km)	300	6.7	1	50
Distance to public stores (km)	105	13.45	1	150
Distance to local fresh produce market (km)	162	19.4	1	500
Tarred road to family and friends market (%)	500	27.4		
Tarred road to public stores (%)	500	30.1		
Tarred road to local fresh produce market (%)	500	47.4		
Gravel road to family and friends market (%)	500	59.2		
Gravel road to road public stores (%)	500	68.9		
Gravel road to local fresh produce market (%)	500	35.1		

with the closest emerging farmer being located about 1 km while the furthest household is located 500 km away. In contrast the family and friends seem to be the closest to a typical emerging farmer. This is not surprising as family and friends are the main output market for the farmers that are located mainly in the rural areas. The closest family and friends is about a kilometre away while the furthest is about 50 km away. Public stores are located at about 13 km away from a typical emerging farmer. The closest public store is about a kilometre away while the furthest is about 150 km away.

Sometimes the distance to the output market is affected by the conditions of the road to that output market. The results show that less than 50% of emerging farmers use tarred road to reach all forms of output markets. Local fresh produce markets are more accessible with tarred roads than the other output markets. This may be because most of the emerging farmers are located in the rural areas and the output markets such as family and friends are located nearer. Output markets such as the local fresh produce markets are located a little bit further in towns which are accessed via tarred roads.

Patterns of access and utilization of output

The principal component extraction method was used to analyse the patterns of the access and use of output market. Table 2 shows the rotated factor patterns for the output market variables. Five factors were suggested by the criterion of Eigen values previously discussed. These factors were the true factors as they explained 71% of the variance in the 12 output market components. The five factors referred to are; road condition to public stores, road condition to local fresh produce market, road condition to family and friends, distance to output market, and percentage of produce to the output market.

Factor 1: Road condition to the public stores

The first factor, road condition to the public stores, explained 22% of the total variance in the 12 output market items. Tarred road to the public stores and the gravel road to the public stores were the items that loaded heavily in this factor. They had a different sign which implies that they are negatively correlated. This is to say that emerging farmers using tarred roads to reach the public stores do not use the gravel road.

Factor 2: Road condition to the local fresh produce market

The second factor, road condition to the local fresh produce market, explained 15% of the total variance in the 12 output market items. Tarred road to local fresh produce market and the gravel road to local fresh produce were the items that loaded heavily in this factor. They had a different sign which implies that they are negatively correlated. This is to say that emerging farmers using tarred road to reach the local fresh produce market do not use the gravel road.

Factor 3: Road condition to the family and friends

The third factor in the factor analysis, road condition to the family and friends, explained 14% of the total variance in the 12 output market items. Tarred road to family and friends and the gravel road to family and friends were the items that loaded heavily in this factor. They had a different sign which implies that they are negatively correlated. This is to say that emerging farmers using tarred road to reach the family and friends market do not use the gravel road.

Table 2. Rotated factor patterns for access and use of output market infrastructure.

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Communality
% Of produce to family and friends	0.011	-0.193	0.325	0.086	0.017	0.151
% Of produce to public stores	-0.360	-0.138	-0.106	0.005	-0.419	0.350
% Of produce to local fresh produce market	0.086	0.010	0.068	0.069	-0.813	0.675
Distance to family and friends market (km)	-0.139	-0.013	-0.071	0.689	0.428	0.626
Distance to public stores (km)	0.147	0.016	0.073	0.700	-0.081	0.543
Distance to local fresh produce market (km)	0.001	0.086	-0.033	0.595	-0.352	0.503
Tarred road to family and friends market (%)	-0.073	0.138	0.965	-0.069	-0.031	0.968
Tarred road to public stores (%)	-0.929	0.068	0.032	-0.044	0.073	0.885
Tarred road to local fresh produce market (%)	-0.037	0.984	0.036	0.052	0.012	0.981
Gravel road to family and friends market (%)	0.073	-0.138	-0.965	0.069	0.031	0.968
Gravel road to public stores (%)	0.918	-0.055	-0.132	0.001	-0.013	0.882
Gravel road to local fresh produce market (%)	0.037	-0.984	-0.036	-0.052	-0.012	0.981
% Of total variance explained	22.2	15.1	13.6	11.1	8.9	

Factor 4: Distance to the output market

The fourth factor, distance to the output market, explained 11% of the total variance in the 12 output market items. Distance to the family and friends, public stores and local fresh produce were the items that loaded heavily in this factor. They all had a positive sign which implies that they are positively correlated, that is the output markets are similarly accessible together. This perhaps implies that emerging farmers can save time and transaction costs by being able to access all the output markets in one place. Whether or not this is possible in the real sense is a question that has to be addressed in future research endeavors.

Factor 5: Percentage of produce to the output market

The fifth factor, percentage of produce to the output market, explained 9% of the total variance in the 12 output market items. Percentage of produce to the public stores and percentage of produce to the local fresh produce market were items that loaded heavily in this factor. Percentage of produce to the public stores and percentage of produce to the local fresh produce market both had a negative sign, which implies that they were positively correlated. This may be the case because some public stores are located near the local fresh produce market. Emerging farmers tend to sell their produce at the same time when they visit both of the output market.

Conclusion

Markets play an important role in improving the incomes of poor farmers. However, markets in South Africa are generally poorly organised and volatile, and often inaccessible to small-scale farmers and also market information that farmers need to negotiate good prices for their

produce are lacking. Even such basic information as current wholesale and retail prices is rarely available. Therefore, building efficient and well-integrated input markets (through which farmers can buy supplies), and output markets (enabling farmers to sell their harvest) is key to encouraging farmers' adoption of sustainable agricultural technologies.

The study has shown that there are patterns that are observable in terms of access to output market infrastructure by emerging farmers. The most commonly used output markets by emerging farmers are family and friends, the fresh produce markets as well as public stores. The distance to all these markets often determines whether or not emerging farmers feel comfortable to sell their farm produces. Friends and family also provide an important market for produce by emerging farmers. Improving road conditions and transport services in rural areas will not only improve accessibility of external markets, but will also improve accessibility of local output markets. These results are similar to findings on access to input markets by Chaminuka et al. (2008) and Makhura and Wasike, (2003). These studies found that there were observable patterns in the access and utilization of input markets and rural infrastructural services by emerging farmers in South Africa.

The implications of this finding is that it is important for policy makers to know that emerging farmers do have access to output market though there are some challenges that they are facing. Road condition to the output market is a challenge problem as most of the emerging farmers use gravel roads, which tend to deteriorate under bad weather conditions and increase the cost of transportation of produce. The role of output market access will stimulate agricultural and rural development which cannot be overemphasized. Improved road between output markets and rural areas and within rural areas themselves will serve many purposes by giving farmers better

access to family and friends, public stores, local fresh produce market and other output markets.

This study paves way for several opportunities for research. Identifying the patterns of access to output markets by emerging farmers lends an opportunity for further investigating the extent to which access to these output markets impact on agricultural profitability by these farmers, and also for investigating the transaction costs that farmers are faced with in accessing the output market that are available. Other studies can also compare the extent to which differences in agricultural productivity and profitability in different regions can be explained by the level of infrastructure development.

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