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## **105- Determinants of participation in identified institutional arrangements in Kenya's export French bean sector**

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### **Abstract**

*The participation of smallholders in export horticulture is often seen as problematic because of the high transaction costs involved and this has further been exacerbated by the introduction of food safety standards in the destination markets. Farmers have to participate in institutional arrangements that help to reduce these transaction costs particularly with the absence of government involvement in marketing. Eight arrangements were identified in Kirinyaga county, a dominant French producing area in Kenya. These arrangements had characteristics ranging from spot market to contractual types of arrangements and farmers participated in them as individuals or as part of a group. 228 French bean farmers were interviewed to assess the factors that influence their participation in the alternative marketing arrangements. A multinomial logit regression was used to identify factors that influenced the choice of each arrangement identified and key determinants included producer's perception of market risk, frequency of transactions, total land acreage, number of years of schooling of household head and distance to nearest agricultural office. The individual farmer-exporter seemed most exclusionary since the choice to participate was influenced by higher levels of mean years of schooling and larger landholdings. Risk and uncertainty were the most common determinants of participation in the eight arrangements.*

### **Introduction**

Export horticulture is a sub-sector within agriculture that has the potential to increase incomes as it has been established that smallholders can be efficient producers when supported by government and producer organisations (World Bank, 2007). Export horticulture can be practiced on relatively small parcels of land and yield higher incomes for farmers than traditional staple cereals such as maize. In addition, the labour intensive nature of horticultural production generates employment within the locality especially for women, who traditionally have been

assigned the role of producing horticultural crops. However, for this potential to be realised, the institutional environment in which these farmers operate needs to ensure that there is a level playing field for all actors and that the necessary infrastructural support is provided. An important aspect of export horticulture development in Kenya has been the fact that it has developed largely within private sector hands. The government has by and large played a regulatory role through the Horticultural Crops Development Authority (HCDA). With the absence of direct government involvement in the export of horticultural products has resulted in the evolution of various marketing institutional arrangements. Institutional arrangements also defined as governance structures is a term used within the New Institutional Economics (NIE) to describe the structures within which members of a society individually or collectively cooperate (Saleth & Dinar, 2004). Similarly, Doward, Poole, Morrison, Kydd, & Urey, 2003, define institutional arrangements are defined as arrangements between economic units that governs the way in which these units can cooperate and/or compete. These economic units e.g. farmers and exporters must find arrangements that help to reduce transaction costs that they face. In the 1980s and 1990s there were a diverse range of institutional arrangements used in procuring French beans from farmers, and these included spot market purchases and various types of contractual arrangements (Jaffee, 1992; Jaffee & Morton, 1995). According ECI, (2001) smallholders continue to participate through various arrangements even as the export destination markets impose stringent food safety standards. However, these standards have had a negative impact on smallholders participation, as many exporters have now turned to larger farmers or own farm production in order to meet these standards (Dolan, Humphery & Harris-Pascal, 2001). The standards have also changed the nature of institutional arrangements that smallholders participate through. An example of this has been the use of group-based contractual agreements by exporters in order to monitor compliance of farmers cost-effectively (Okello & Swinton, 2009; Asfaw, Mithöfer & Waibel, 2006). Other studies discuss non-contract based arrangements (Kariuki, Obaro & Loy, 2006; Strohm & Hoeffler, 2006; Voor de Dag, 2003) but none of these studies has looked at the arrangements in totality, which is what this study aimed to do. It also study also sought to determine what influenced a farmer's choice of arrangement to participate in.

## **Methodology**

### **Study area**

This study focused on the French bean production, which is the largest vegetable export and small-scale farmers have the longest experience in growing it compared to other vegetables. The areas in Kenya where French beans are grown include Kiambu, Machakos, Nyandarua, Nakuru, and around the Mt. Kenya region i.e. Embu, Meru, Kirinyaga and Nyeri (Okado, 2000). This study focused on farmer and farmer groups within Kirinyaga area, which has had a long history of growing this crop, and relatively well organised groups of farmers (C. Kyengo, personal

communication, November 19, 2008). Fieldwork was carried out between March and September, 2010.

### **Sampling and data collection**

The study used stratified random sampling in order to achieve a high degree of representation from groups with the desired characteristics, namely French bean growers. The sub-location with the highest concentrations of French bean farms in Kirinyaga Central, East and West districts were first selected. In Kirinyaga South, three sub-locations were selected because this district alone accounts for about 50% of the total French bean production in Kirinyaga. With the help of local agricultural officers, lists of farmers were generated which constituted the sampling frame. The total number of growers in the sampling frame was 568 growers. The respondents were then randomly sampled from the lists using random tables. The sample size for this study was 228 grower households. The questionnaires were first pre-tested and then revised for questions that were either repeated or vague. The households that were used for pre-testing the questionnaire were excluded from the final survey. A questionnaire (interview schedule) was then administered to the sampled households. Key informant interviews with District Crop officers, Fresh Produce Exporters Association of Kenya (FPEAK) official and farmer-group officials. These were selected to provide an expert perspective on the industry (FPEAK) and on Kirinyaga generally. Focus group discussions were conducted in each of the four districts. With the help of local agricultural officers and researchers who had previously carried out work in the area, eight French bean farmers (four working with exporters and the other four with brokers) were identified to participate in a focus group. Each of the groups had both men and women. The focus groups were facilitated and moderated by one of the participants chosen by the group and the researcher recorded the proceedings. Eight marketing arrangements were identified by farmers and key informants interviewed. They included:

1. Selling individual farmer to an exporter.
2. Selling as part of a group to an exporter.
3. Selling as an individual farmer to an exporter's agent.
4. Selling as part of a group to an exporter's agent.
5. Selling as an individual farmer to a broker/other farmer within the area.
6. Selling as part of a group to a broker/other farmer within the area.
7. Selling individually to a broker from outside the area.
8. Selling as part of a group to a broker from outside the area.

### **Data analysis**

Farmers were asked to list their most preferred arrangement (for those who participated in more than one) while it was assumed that if a farmer participated in only one arrangement, that arrangement was their preferred one. The Multinomial Logit Regression (MNL) was used to determine the factors that influenced farmers' choice of institutional arrangement. This model has been used widely in assessing discrete choices (Okello, Lagerkvist, Hess, Ngigi & Karanja 2011); for example in this study it was used to assess a farmer's choice of their most preferred marketing institutional arrangement. The six institutional arrangements that were considered in the model were selling as an individual farmer or as part of a group to an exporter, selling as an individual farmer or as part of a group to an exporter agent and selling as an individual farmer or as part of a group to a broker within the area. Selling as an individual farmer to a middleman from outside the area was the reference category. The choice of which arrangement to participate in is hypothesised by the TCE theory to include factors such as the perception of risk by producers and buyers, the frequency of transactions and the degree to which one has invested in assets that are specific to French bean production. Some studies (Jabbar, Rahman, Talukder & Raha, 2007; Cai, Ung, Setboonsarng & Leung, 2008) have also used demographic factors, farm characteristics and market access variables to model determinants of choice of marketing or purchasing channels. This study also modelled these factors to determine their impact on the farmer's choice of marketing arrangement.

The estimated logit model can therefore be expressed as follows:

$$P_j = \frac{y_j}{x_j} = \frac{\exp(\beta_{kj} + \sum_k \beta_{1k} x_{jk} + \varepsilon_j)}{\sum_{i=1}^J \exp(\beta_{ki} + \sum_k \beta_{1k} x_{ik} + \varepsilon_i)} \quad (1)$$

where  $\beta_j$  refers to the column vector of parameters that weight exogenous variables in determining the utility choice  $j$ ; and  $\mathbf{X}_i$  is a row vector of exogenous variable values corresponding to the explanatory variables listed below.

The predictor (explanatory) variables used were:

- a) Household characteristics including *gender*, a dummy variable equal 1 if a household head was female and 0 otherwise, natural log of age measured in years (*lnage*), natural log of years of education (*lneduc*), natural log of total value of household assets measured in Kenya shillings (*lnassetvalue*).
- b) Farm characteristics including natural log of total acreage of land measured in acres (*lnacreage*), natural log of distance to the nearest market measured in kilometres (*lnstnrmkt*), natural log of distance to nearest agricultural office measured in kilometres (*lnstnagr*).
- c) Market-access variables including *bicycle*, a dummy variable of 1 if owned and 0 otherwise, *mobile*, a dummy variable of 1 if owned and 0 otherwise

- d) Degree of asset specificity- natural log of size of land under French bean measured in acres (*lnsizeland*), natural log of specific investment in French bean production e.g. protective clothing measured in Kenya shillings (*lninvcost*).
- e) Frequency of transactions- number of times a farmer grew French beans in a year (*timegrow*)
- f) Production risk (*prodnrisk*) and market risk(*mktrisk*) measured using factor scores derived from a Likert scale
- g) Trust in buyers commitment to establish long term relationship (*relnship*) measured using factor scores derived from a Likert scale

## **Results**

This is because this channel is assumed to be the most risky and unpredictable for farmers to participate in given that it has the characteristics of a spot market transaction where there is no prior agreement, formal or informal, between buyer and producer. The results of MNL estimated are presented in table 14 below for each of the six arrangements.

**Table 1: Factors affecting choice of institutional arrangement by French bean farmers- Results of Multinomial logistic regression**

Reference category=individual farmer-broker from outside the area

	Individual Exporter		Group Exporter		Individual Exporter agent		Group exporter Agent		Individual broker within		Group broker within	
Variable	Coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value	coeff	p-value
<i>Household characteristics</i>												
Age	2.46	0.141	1.99	0.233	4.78	0.020**	2.21	0.202	2.57	0.162	-0.80	0.791
Years of education	1.37	0.079***	1.98	0.007*	2.37	0.120	1.08	0.173	1.57	0.055***	4.03	0.080***
Gender	0.32	0.688	0.81	0.307	0.99	0.371	0.55	0.518	0.63	0.447	0.18	0.936
Household total asset value in Kshs.	-0.52	0.170	-10.5	0.234	-0.45	0.513	-0.36	0.359	-0.14	0.731	-1.18	0.267
<i>Farm characteristics</i>												
Distance to nearest market	-0.89	0.126	-1.10	0.059***	0.00	0.999	-0.14	0.814	-0.02	0.981	0.29	0.834
Distance to agric office	0.67	0.310	-0.70	0.252	1.93	0.016**	-0.63	0.319	0.23	0.735	0.76	0.539
Lnacreaage	0.81	0.141	1.36	0.014**	0.11	0.899	1.00	0.058***	1.44	0.019**	1.73	0.059***
<i>Market access factors</i>												
Bicycle	0.64	0.570	0.10	0.926	-0.97	0.522	1.97	0.090***	1.06	0.378	-0.49	0.873
Mobile	-0.34	0.786	-0.36	0.771	-1.19	0.432	1.05	0.432	-0.53	0.679	-37.0	0.000*
<i>Risk/Uncertainty factors</i>												
Production risk	0.23	0.431	0.27	0.516	0.44	0.296	0.59	0.102	-0.63	0.045**	-0.69	0.102
Market risk	1.32	0.017**	2.02	0.00*	1.14	0.149	1.33	0.016**	1.64	0.004*	1.13	0.090***

<b>Relationship with buyer</b>	-1.11	0.008*	-0.63	0.109	-0.47	0.363	-0.29	0.415	-0.14	0.720	-0.64	0.422
<i>Degree of asset specificity</i>												
<b>Size of bean plot</b>	-0.17	0.808	-0.76	0.256	-0.36	0.682	-0.55	0.448	-0.95	0.179	-2.79	0.013**
<b>Specific investment in bean production</b>	0.28	0.614	0.40	0.493	0.00	0.995	0.33	0.573	0.29	0.643	1.43	0.035
<i>Frequency of transactions</i>												
<b>No. of times beans grown</b>	1.06	0.011**	1.20	0.002*	0.79	0.132	1.18	0.003*	0.44	0.284	0.52	0.627
<b>Constant</b>	-10.3	0.160	-9.07	0.203	-23.15	0.006	-10.8	0.126	-15.4	0.051	-9.49	0.245
<b>N=224</b>	<b>wald chi-square= 3293.27</b>		<b>p-value= 0.000</b>		<b>pseudo R-squared=0.3011</b>							

\*Significant at 1% level

\*\* Significant at 5% level

\*\*\*Significant at 10% level



The results in Table 1 above are discussed here starting with the selling as an individual farmer to an exporter relative to broker from outside the area. The predictor variables, the number of times one grew French beans in a year (*timegrow*,  $p= 0.011$ ,  $\text{coeff}= 1.064$ ), the lack of trust in the buyer's ability to maintain a long-term relationship with the farmer (*relnship*,  $p=0.008$ ,  $\text{coeff}=-1.112$ ) and the perception of market risk by farmer (*mktrisk*,  $p=0.017$ ,  $\text{coeff}=1.315$ ), were significant explanatory variables of participation in this arrangement.

The number of times a farmer grew French beans in a year increased the possibility of choosing to sell individually to an exporter relative to a broker from outside the area. This finding is supported by the transaction cost theory where a high frequency of transactions required between buyer and seller necessitates the need for a contractual type of agreement because a default in these frequent transactions by one or both parties is more costly for both parties than if the frequency of transactions were few and far between.

A lack of trust in the buyer's ability to maintain a long term relationship with the farmer decreased the likelihood of a farmer choosing to participate in the individual-exporter channel relative to the individual-broker from outside the area channel. Trust is an important aspect of the relationship between farmers and exporters in Kirinyaga and as indicated earlier those who sold as individuals to exporters did not have written contracts as would be expected because they trusted the exporter to keep to the terms of their agreement. Therefore if a farmer does not trust an exporter he/she is unlikely to sell to him as an individual. This is perhaps because of the lack of contractual enforcement mechanisms pervasive not only in Kirinyaga but in Kenya generally with regard to farmer-buyer contracts.

As a farmer's perception of market risk so did the likelihood of participating in the individual-exporter arrangement rather than the individual-broker from outside the area controlling for all other variables in the model. The transaction cost theory supports this finding because it is hypothesised the higher the risk the players face, due to lack of adequate information and the likelihood of opportunism by the other party, the more likely they are to seek contractual arrangements.

In predicting factors likely to affect a farmers decision to participate in the selling as part of a group, the number of times a farmer grew French beans in year (*timegrow*,  $p=0.002$ ,  $\text{coeff}=1.195$ ), perception of market risk by the farmer (*mktrisk*,  $p=0.000$ ,  $\text{coeff} 2.025$ ), natural log of the total acreage of land (*lnacreage*,  $p=0.014$ ,  $\text{coeff}=1.360$ ), natural log of the number of years of schooling of household head (*lneducat*,  $p=0.007$ ,  $\text{coeff}=1.981$ ), were significant explanatory variables.

As with the individual-exporter arrangement both the increase in the number of times a farmer grew beans in a year and the increase in the perception of risk by the farmer were associated

with increased likelihood of participating in the group-exporter channel compared to the individual-broker from outside the area channel all other factors being held constant. The contractual agreement entered into by the group with an exporter helps to define terms such as price, collection times and grades required among other parameters which helps to reduce risk because of availability of information. On the other hand, the collective action afforded by the group helps to increase farmers' negotiation power with the exporter all of which would make the group-exporter channel more attractive for producers.

As the amount of land a farmer owned by the farmer increased the likelihood of the farmer participating in selling as part of a group to an exporter rather than selling to individually to a broker from outside the area increase. This could be attributed to requirement by exporters that farmers rotate their crop of French beans as part of the pest and disease management program. In order for one to practice this rotation one would require must a reasonably sized piece of land. This would imply therefore that farmers with small parcels of land were unlikely to participate in this arrangement. An additional year of schooling also increased the likelihood of participating in the group-exporter channel rather than individual-broker from outside area all other factors held constant. This finding is supported by evidence from various studies that show that contract farmers tend to be better educated than other farmers (Little & Watts, 1994, Singh, 2005). It is likely that farmers and group of farmers who sought exporters to enter into contractual arrangements with would have more exposure and understanding as a result of education.

Significant explanatory variables for farmers choosing to sell individually to an exporter agent relative to individually to broker from outside the area were the natural log of distance to the nearest agricultural office (*Indstnragr*,  $p=0.016$ ,  $coeff=1.927$ ) and natural log of the age of the household head (*Inage* ( $p=0.020$ ,  $coeff=4.781$ )). An increase in the distance to the nearest agricultural office increased the likelihood that a farmer will participate in the individual-exporter agent channel relative to the individual-broker from outside the area channel. This is perhaps because exporter agents would want to reduce competition from other buyers among farmers by identifying those who are located far from the agricultural office because agricultural officers can easily identify farmers near the offices for a new buyer in the area.

An increase in the age of the household head was positively associated with the likelihood of choosing to sell individually to an exporter agent relative to a broker from outside the area. In other words, older farmers had a preference for exporter agents than brokers from outside the area. Perhaps this is because these farmers would like to participate in a more secure arrangement but because they are unable to proactively seek contracts from exporters which would require travel to Nairobi for instance, they then get into contractual arrangements with exporter agents who are located in their vicinity.

The significant explanatory variables in the selling as part of a group to an exporter agent relative to selling individually to a broker from outside the area were number of times a farmer grew French beans in a year (*timegrow*,  $p=0.003$ ,  $\text{coeff}=1.182$ ) and the perception of market risk by the farmer (*mktrisk*,  $p=0.016$ ,  $\text{coeff}=1.333$ ). As with the individual-exporter and group-exporter arrangements both the increase in the number of times a farmer grew beans in a year and the increase in the perception of risk by the farmer were associated with increased likelihood of participating in the group-exporter channel compared to the individual-broker from outside the area channel all other factors being held constant. The more times a farmer grew French beans the more transactions he or she would require therefore the more he or she would seek out contractual arrangements as offered by the exporter agent. Also, the higher the perception of market risk, the higher the odds that a farmer would participate in the group-exporter agent relative to the individual-broker from outside the area arrangement. The exporter agent provided contracts to farmers which guaranteed a market for their produce and for the exporter agent working with a group to reduce certain compliance risks since groups help with monitoring of individual members.

In predicting factors likely to affect a farmers decision to participate in the selling individually to a broker or other farmer within the area relative to selling individually to a broker from outside the area the significant variables were, perception of production risk by farmer (*prodrisk*,  $p=0.045$ ,  $\text{coeff}=-.633$ ), perception of market risk by farmer (*mktrisk*,  $p=0.004$ ,  $\text{coeff}=1.638$ ) and natural log of total acreage of farm (*lnacreage*,  $p=0.019$ ,  $\text{coeff}=1.438$ ). An increase in the farmer's perception of production risk (due to damage caused by pests, diseases, drought, floods) decreased the likelihood that he/she would participate in the broker within the area rather than a broker outside the area. Perhaps this is because the more the damage to the French beans during the growth stage the lower the quality of the beans and the less likely a broker within the area, who is familiar with this challenge, is to buy this produce. A broker from outside the area is likely to be less discerning and would therefore be a more likely buyer. In addition, as the farmer's perception of market risk increased so did the likelihood of him/her selling to broker within the area rather than from outside the area. A broker who is also another farmer in the vicinity of the farmer is more likely to be trusted by the farmer than a buyer who is not a local and the he/she will feel less vulnerable in his/her transactions with him.

The more land a farmer owned, the greater the likelihood of the farmer participating in the individual-broker within the area rather than outside the area. This is perhaps due to the fact that the more land a farmer has the more French beans he/she can grow and the more beans he has to sell the more secure an arrangement he is likely to seek. Given that the broker from outside the area is an erratic arrangement farmers with more French beans to sell (from more land) will prefer to sell to a broker whom they have some knowledge of, or association with, to reduce the risk of non-collection.

The predictor variables significant in distinguishing participation in group-broker within area from broker-outside area were ownership of mobile phone (*mobile*,  $p=0.000$ ,  $\text{coeff}=-36.949$ ), natural log of the size of plot that French beans were grown (*lnsizeland*,  $p=0.013$ ,  $\text{coeff}=-2.787$ ), and natural log of the specific investment in French bean production (*lninvcost*,  $p=0.035$ ,  $\text{coeff}=1.437$ ). Ownership of a mobile phone decreased by the likelihood that a farmer would participate in the group-broker within area channel compared to individual-broker outside the area channel. This is perhaps because a farmer operating within a group does not need to contact a broker within his/her vicinity by phone because that would be done by group officials or it could be done verbally or face to face. On the other hand a farmer who uses a broker from outside the area would require a mobile phone to communicate with his buyer.

As the size of plot used to grow French beans increased, the likelihood of participating in the group-broker within area relative to individual-broker outside the area decreased. In other words, the larger the plot of French beans a farmer had the less likely they were to participate in this channel compared to individual-broker outside the area. It would seem that farmers who have large amounts of French beans do not trust this channel as a preferred arrangement perhaps due to its seasonal nature.

As the amount of investment costs made for French beans increased so did the likelihood of a farmer participating in this channel. The most cost effective way for farmers to invest to achieve compliance to food safety standards is to invest through a group and this could explain why increased investments were associated with group membership in this channel.

## **Discussions**

The factors modelled in the multinomial regression were categorised as those associated with asset specificity, frequency of transactions and risk and uncertainty and these were derived from the transaction cost theory. Other categories included household characteristics, farm characteristics and perception of trust and market-access characteristics.

The producer's perception of market risk was the most common factor influencing their choice of marketing arrangements, specifically, individual-exporter, group-exporter, group-exporter agent and individual-broker within. The exporter and exporter agent as buyers enter into formal agreements with the farmers in form of annual contracts. This arrangement is likely to reduce the uncertainty for farmers with regard to searching for a buyer every time they harvest their crop. The transaction cost theory supports this finding as it postulates that the higher the risk involved for any of the players the more likely they are to seek formal (contractual) relationships in order to monitor the behaviour of the other players and reduce opportunism.

Interestingly, the perception of risk was also a significant determinant of participation in the individual-broker within channel. The higher the perception of risk the more likely a farmer would choose this channel over the individual-broker outside the area. In this case, the attraction of the broker within the area was due to the fact that the farmer had personal information and perhaps even a relationship with the broker by virtue of being in his/her village resulting in increased trust in this buyer. Some of these brokers also entered into informal agreements with the farmer that they would guarantee a market for their produce.

Results also showed that the frequency of transactions is a significant determinant of participation for those who chose to participate in the individual and group-exporter channels and the group-exporter channel. This finding is not surprising given that the contracts by exporters and exporter agents are yearly, thereby requiring all-year production by the farmers. In addition farmers will also stagger their planting so that they have readily available produce throughout the year thereby increasing the number of times they grow French beans. These farmers would then have to seek long-term and more secure arrangements such as those offered by contracts to protect themselves against potential losses arising from spot market type transactions. The alternative buyers, brokers, tend to be highly seasonal therefore unsuitable for farmers who are producing all year round. The specific investment in French bean production was only associated with increased participation in the group-broker within channel.

Household and farm characteristics were modelled in the multinomial logistic regression to assess their importance in determining a farmer's choice of the marketing institutional arrangement to participate in. The results indicated that factors such as the total land acreage, number of years of schooling of the household head, distance to the nearest agricultural office, ownership of a mobile phone affected the choice marketing arrangement used by the farmers.

In the group-exporter channel, farmers with more land and more years of schooling were more likely to participate in this channel. This is similar to findings of studies that have found that farmers with larger landholdings are more likely to participate in contracts (Jabbar *et al.*, 2007, Tiongco *et al.*, 2009). Some studies have also found that more educated households were more likely to participate in contractual arrangements with buyers (Cai *et al.*, 2008, Jabbar *et al.*, 2007). It can therefore be concluded that there seems to be exclusion of farmers with small landholdings and those who are least educated from participating in this channel, and these groups of farmers are most likely to be the poorest in the community. This would imply that the poverty-reducing potential of this channel is low. Paradoxically, this is the channel that some have recommended as the most appropriate for smallholders because of the ability of farmers to secure contracts with exporters who are considered reliable buyers and also the reduced cost of investment for farmers in achieving food safety compliance due to collective investments (Okello *et al.*, 2009, Asfaw *et al.*, 2009).

In the individual- exporter agent arrangement, the factors associated with participation point to a more inclusive channel. Specifically, older farmers and farmers who are far from agricultural offices are more likely to participate in this channel. While this indicator is often used to measure access to information by farmers, in the case of Kirinyaga, it is a better indicator of accessibility of the farm rather than access to information because agricultural officers are not major players in disseminating extension information to French bean producers. Most of agricultural offices are located in town centres and therefore the distance to the nearest agricultural offices can be used as proxy to access to nearest major town centre. Some studies have shown that farmers in remote areas and regions are often marginalised from participating in contract farming perhaps due to the fact that the road infrastructure to some of these areas is usually poorly developed (Cai *et al.*, 2008). Other studies have also found that brokers or middlemen unlike exporters will prefer farmers who are further away from main roads to reduce competition for produce (Kariuki *et al.*, 2006). Therefore the exporter agent channel is important for linking French bean producers in remote areas to the export markets. In addition the participation of older farmers in this channel is also important for poverty-reduction as many of these households have diminished sources of income and are least likely to migrate in search of economic opportunities.

### **Conclusions and recommendations**

In conclusion therefore, risk and uncertainty were key determinants in participation in the exporter, exporter-agent and broker-mediated channels. A higher frequency of French bean production was an important determinant of participation in the exporter channel. The group-exporter channel although the most preferred and recommended arrangement, is the one that excludes resource- poor farmers the most. Specifically, households with smaller land holdings and those with less years of schooling were less likely to participate in this arrangement. Farmers with larger landholdings also participated more in the individual-broker channel. The individual-exporter channel was associated with more inclusive factors such as older farmers and farms which were located further away from town centres. Participation in the group-broker channel was associated positively with a larger plot of French bean and increased specific investment in French bean production and negatively with mobile phone ownership. Trust was only significant in determining participation in the individual-exporter arrangement.

As enforcement of safety standards continue to tighten and as contractual arrangement continue to dominate their will be need for building skills among less educated farmers to ensure that they do not completely fall out of these lucrative value chains.

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