Assessing producers' perceptions of protecting coffee and apple mangoes as geographical indications in Kenya

Maina FW and Mburu J

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Maina FW[*1] and Mburu J[1]

[1] Department of Agricultural economics, University of Nairobi, P.O. Box 29053, Nairobi, Kenya

Abstract

Consumers are increasingly demanding for information on product quality, methods and characteristics of geographical region of production. As such, protecting unique products as geographical indications is on the increase. Geographical indications identify a product as originating from a region where a given quality, reputation or other characteristic desired by consumers, is essentially or exclusively attributable to its geographical origin. Having the legal legislation is necessary but not sufficient factor in protection of products as geographical indications (GI). Other essential factors include the producers' awareness of the uniqueness and willingness to register the product for protection and marketing. Their perceived benefits and other characteristics will influence their decision to register the product as a GI. The study sought to understand underlying variables describing producers' perceptions of the quality of coffee in Muranga and mango in Makueni as potential geographical indications. At least 132 producers randomly sampled were interviewed in each county using semi-structured questionnaires. The study applied factor analysis to summarise producers' perceptions and regressed the resulting factors against a set of explanatory variables to determine factors influencing these perceptions. Six and five underlying variable (factors) were identified for coffee and mango producers' perceptions respectively. The factors explained at least 75.3% and 71.5% of the variance in the original variables for coffee and mango producers' perceptions respectively. The regression results with varying F-statistics showed the importance of conducting specific analysis for each product in each region to identify the potential for protecting the products as GI.

Keywords: Factor analysis, geographical indications, producer perceptions, coffee, apple mango,

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Introduction

Geographical indications and role as a marketing tool

Protecting unique products as geographical indications has increased in importance in many countries in the world. It has gained more importance in the European Union as well as in South American and Asian countries. According to the TRIPS definition (Article 22), Geographical Indications (GIs) identify a product as originating from a territory, or a region or locality, where a given quality, reputation or other characteristics of the product are exclusively or essentially attributable to its geographical origin. Increasingly, countries in Africa are exploiting the concept and some have had their products protected within their country and in the European Union and other markets using varying mechanisms. These include Rooibos tea in South Africa (protected under trademark act), Oku Honey in Cameroon (protected under GI act), Argan oil from Morocco, among others.

Consumers are also increasingly demanding for information on product quality and methods as well as geographical characteristics of the production region. Producers are hence tasked with the duty of ensuring that information gets to consumers. This in turn has resulted in increasingly mechanism to ensure that production from the farm to the market entails sustainable practices coupled with better focus on human safety. Where the product can also be packaged as having its preferred quality being essentially and exclusively linked to the production region, the product can further be registered as a geographical indication, and even earn a premium price among consumers who value the place-related attributes (Vandecandelaere, Arfini et al. 2010, Belletti 2000). However, protecting a product as a geographical indication (GI) is not sufficient condition to ensure that the producers can sell it a premium price. Different products in different regions accrue different costs and benefits from such a protection. A well-defined geographical indication requires quite some investment to ensure sustainability and market acceptance (Giovannucci, Josling et al. 2009). Whereas premium prices are often based on consumer perceptions, producer perceptions of the quality of their product is also essential in influencing their adoption or acceptance of new innovations (Adesina, Baidu-Forson 1995).

In Kenya, the geographical indication legislation is not yet enacted. However, drafting instructions have been developed and revised, awaiting discussion and enactment. This study therefore sought to identify *a priori* producers' perceptions of the uniqueness of their products and the potential to protect them as geographical indications. Specifically the study focused on two perennial crops, coffee produced in Muranga and apple mangoes produced in Makueni County.

The coffee sub-sector

The coffee sub-sector is an important economic activity in Kenya. It has previously been a leading earner of foreign exchange (accounting for as much as 40% of total value of exports in previous years), generated employment and income for the farming communities as well as

tax for the government (Mitchell 2012). Kenyan coffee is among the best in the world mainly comprising the more flavourful Coffee Arabica varieties. According to (Mureithi 2008), the characteristics of the coffee growing regions collectively contribute to the unique and desirable quality. These characteristics include the red deep volcanic soils, well distributed rainfall and high altitude (1500 – 2000 m asl). The production regions hence have moderate temperatures (average 20^0C) with characteristically high equatorial ultra violet sunlight diffusing through thick clouds (Mureithi 2008, Monroy, Mulinge et al. 2013). The above characteristics are inherent in coffee production regions through the country, though in varying degrees.

Although production zones are distributed throughout the highland regions of the country, (Mureithi 2008) observes that 70% of the coffee comes from the highland production zone triangle formed by Mr. Kenya, Aberdare ranges and Machakos town. Production in these regions is however on the decline as more land shifts to alternative uses. The share of coffee in the agricultural GDP of the country fell from 14% in 1999 to 6.7 percent in 2005. Primary processing of coffee is done by either estates or through coffee cooperatives comprising a group of small scale farmers. The coffee value chain comprises of several nodes from primary processing, through to secondary processing and marketing, each stage having different cesses and taxes. Whereas the coffee act requires that 80% of the FOB price be paid to the farmers, the prices received by the farmers are still very low following various deductions at factory level. In terms of production, coffee cooperatives own 75% of all land under coffee production, with estates owning the remaining 25%. However, production from cooperatives represents only 54% of total production with yields accounting for only 28% of coffee produced in the country. The estates are vertically integrated with processing and marketing operations as opposed to cooperatives, which are only involved in primary processing (Monroy, Mulinge et al. 2013).

The current marketing system as described by the Coffee Directorate has allowed emergence of *terroir* growers who produce high quality coffee for specialist consumers at a premium price (Monroy, Mulinge et al. 2013). In view of its uniqueness, that still attracts interest from the international market, the farmers can differentiate their coffee in a bid to fetch higher farm gate prices. Better prices would encourage the producers to increase their productivity. However, other challenges exist in the sub-sector including poor management of the factories as well as farmers limited influence of the chain beyond their farms. This coupled with inefficiencies in primary processing affect the prices that producers receive for delivered coffee. Considering that coffee quality is influenced by all activities within the value chain from production to processing, and handling, increasing producers influence of the production process and hence the prices, would ensure that the unique qualities are preserved.

Mango sub-sector
Mango, the second most important fruit in Kenya after bananas in terms of production volumes, has increasingly grown as an export crop. According to USAID-KAVES (2014), mango exports accounted for 15.6% of total fruit export in 2012. The fruit is cultivated in a cross-section of agro-ecological zones in Kenya, and often in regions that are not suitable for

production of most food crops (Rohde, Njuguna et al. 2010). ADB (2011) reported that Eastern Region in Kenya had more than 3 million apple mango trees, a third of which were found in Makueni County. Production in this County increased over the last decade with farmers adopting better management practices and varieties to exploit the benefits from the fruit production (Agribusiness Development (ABD) 2011). In the lower eastern region, although mango production is lower than in the coastal region, the fruits are preferred by consumers and hence exporters since they are of better quality. Mango marketing in the county, for both domestic and export markets, are characterised by presence of middlemen who are the main price setters. Being a seasonal crop that is highly perishable, the farmers do not often benefit from the consumer demand for the unique quality of the fruits from the region.

Current mango exports are mainly to the Middle East. With growing interest to penetrate more markets, there is need to improve, not only the production sustainability, but also the packaging of this highly perishable product in order to enhance its marketability.

Objective of the study
The purpose of this study was to understand the producers' perceptions of the quality of coffee and mango as a potential geographical indications in Murang'a and Makueni Counties respectively.

The paper used factor analysis to summarise the farmers' perceptions regarding various variables relevant to the protection of the respective crops as geographical indications. The summarised factors were then regressed against household specific variables to determine the factors influencing the perceptions.

According to the GI regulations, the producers are the ones who register their unique product, identifying the place-based characteristics and the boundary within which the characteristics manifest. Therefore, it is important to identify farmers' subjective perceptions and how this is likely to influence any efforts aimed at registering the products. Both crops of focus are perennial crops, but coffee is grown in medium-high altitudes, while mango production in Makueni is practiced in the low agro-ecological regions.

2. Theoretical analysis of producer perceptions
In adoption of new agricultural technologies or concepts, like geographical indications, perceptions and attitudes can be used in profiling the producers according to their objectives and tendency towards adoption (Adesina, Baidu-Forson 1995, Adisa, Adekunle 2010, Blazy, Carpentier et al. 2011, Sepúlveda, Maza et al. 2010). The assumption is that farmers' perceptions especially on the influence of the new innovation on their income influences the subsequent adoption. Since perceptions are characterised by multiplicity of variables, the factor analysis is applied to condense these variables and explain them in terms of the common underlying "factors" without losing any information (Hair Jr., Black et al. 2010).

Factor analysis, a form of multivariate analysis, measures interdependence between variables (Jolliffe 2002). The model was specified by the matrix equation given below, following Pennings and Leuthold, (2000):

$$F = \Lambda L + \delta \tag{1}$$

Where F is a *qx1* vector of observed variables; $\square$ is a *qxn* matrix of regression coefficients (factor loadings) to be estimated; L is a *nx1* vector of latent variables (factors) that are estimated along with coefficients; and $\square$ is a *qx1* vector of specific error terms corresponding to the variables to be observed.

The eigenvalue for a given factor measures the variance in all the variables that is accounted for by that factor. The square of the resulting factor loadings, on the other hand, is the percent of variance in the observed variable explained by the factor. Following the rule of thumb as described by Field (2013), the factors with Eigenvalues greater than 1 were retained and used to generate factor scores. These factor scores were then used as dependent variables in a series of multiple linear regressions to determine factors influencing farmers' perceptions of various GI related aspects of their respective crops. The multiple regression was specified as:

$$Perception_i^j = \beta`X + \varepsilon_i \tag{2}$$

Where Perception(j,i) stands for the ith coffee or mango producer's perceived score corresponding to the jth underlying perceptions; X is a vector of explanatory variables of the respondent; β' is a vector of regression parameters to be estimated and the ε_I are vectors of disturbance terms in the regression.

3. Data collection and analysis

A semi-structured questionnaire was used to gather qualitative and quantitative primary data from Murang'a (coffee) and Makueni (apple mango) counties respectively. The questionnaires were administered to 132 producers in each of the counties. The survey was conducted between July and August 2015. Data was collected on household demographic, farm and production related information. To capture the perceptions, questions requiring likert scale responses were asked, and coded as ordinal variable from 1(least important) to 5 (most important). The data was entered and factor analysis conducted using Stata 11. The components with eigenvalue greater than 1 were be selected. The rotated component matrix, which gives the factor loadings for each variable onto each factor were then used to identify the factors (underlying variable) and hence the variables of interest. Following Stevens (2002), only the factor loadings greater than 0.4 were be considered as they represent substantive loadings.

At least 76% and 81% of households surveyed in Murang'a and Makueni counties respectively were male headed. The average age of the household heads was 53 in Muranga and 62 in Makueni counties. Of interest in the analysis is that household demographic characteristics did not influence the producers' perceptions.

Description of explanatory variables used in regression analysis
The explanatory variables used in the regression analysis for each of the products are described on Table 1 for coffee and for mango producers.

Table 1: Description of variables hypothesised to influence producers' perceptions of coffee as a potential geographical indication in Murang'a County

Explanatory variable	Description	Type of variable
No of coffee bushes	Total number of coffee bushes owned by the household	Continuous
Coffee Society	The coffee society the producer belongs to	Dummy variable (1-4)
Coffee grp	Whether producer belongs to other coffee group	Dummy (1=Yes, 0=No)
Awareness of unique coffee quality	Whether producer is aware of uniqueness of quality based on geographical region	Dummy (1=Yes, 0=No)
Consider Coffee directorate support important	Whether producer considers the coffee directorate as important in registering coffee as a GI	Dummy (1=Yes, 0=No)
Price of cherry 2014	Average price (per kg) producer received for cherry in 2014	Continuous
Region influence on coffee Price	Does producer think the region of production influences price and quality of coffee	Dummy (1=Yes, 0=No)
Access to credit	Did producer access credit in the last 5 years	Dummy (1=Yes, 0=No)

Explanatory variable	Description	Type of variable
Receive info on mango production	Did producer receive information on mango production and prices in 2014	Dummy (1=Yes, 0=No)
Who sets price received by producers	Who sets price received by producer for mangoes delivered to market	Categorical (1-6)
Willing to contribute to GI protection?	Producer willingness to contribute to protect the apple mangoes in the region as a geographical indication	Dummy (1=Yes, 0=No)
Awareness of unique apple mango characteristics due to geographical region	Whether producer is aware that the apple mango in the region is unique essentially due to the geographical region	Dummy (1=Yes, 0=No)
Sex of HHH	Sex of household head	Dummy (1=Male, 2=Female)
Age of HHH (in years)	Age of household head in years	Continuous
GI and better marketing	Does producer consider GI protection as a tool that will improve marketing of apple mangoes	Dummy (1=Yes, 0=No)
Member of producer association	Is producer a member of a mango-related	Dummy

	producer association/group	(1=Yes, 0=No)
County govt. support	Does producer consider county government support as essential for the success of an apple mango GI protection	Dummy (1=Yes, 0=No)
State Dept support	Does producer consider state departments as essential for success of apple mango GI protection	Dummy (1=Yes, 0=No)

4. Results and discussions

4.1 Factor analysis of coffee and mango producers' perceptions of geographical indication-related attributes of their products

The variations in the producers' perceptions of their crops as potential GI are summarised in six and five factor solutions in Muranga (Table 2) and Makueni (Table 3) counties respectively. At least 75.3% and 71.5% respectively of the variance in the original variables is explained by the resulting factors for coffee and mango production. The Kaiser-Meyer-Olkin measure of sampling adequacy was in both cases higher than 0.5, showing inter-correlations among the variables selected. Only the factor loadings that were, in absolute terms, greater than 0.4, were used in naming and interpretation of the results.

Variables relating to the importance of GI registration in market prices and access loaded highly on factor 1 while those relating to rules and institutions loaded heavily on factor 2. These two factors explained at least 33% of the variation experienced in the coffee producers' perceptions (Table 2). In mango production, variables relating to stakeholders involvement (other than the producers) loaded heavily on factor 1 while those relating to policies and institutions loaded onto factor 2. The two factors explained at least 38% of the variation experienced in the producer perceptions (Table 3)

The remaining factors on coffee as a GI can be summarised as registration attributes (factor 3), region related (factor 4), price related (factor 5) and stakeholder participation (Factor 6) (Table 2). Perceptions of mango as a GI can be summarised as market related (factor 3), cost-information related (factor 4) and minimum guaranteed returns for mango (factor 5) (Table 3).

The results show the different focus of producers based on the current challenges facing each of the sub-sectors. In coffee production, where stakeholder participation is high already, only the governor's and administrative offices were included in the analysis. Including other stakeholders reduced the statistics (KMO, variance explained, as well as the factor scores). On the other hand, in mango production, which is characterised by high presence of middlemen, stakeholder involvement loaded highly on the first factor. In both instances, support through policies and rules loaded highly on the second factor.

Table 2: Factor analysis of producers' perceptions of coffee as a geographical indication

Variable	Factor [a,b]					
	1	**2**	**3**	**4**	**5**	**6**
Better market prices as a result of protection	0.882	0.175	-0.039	0.039	-0.002	-0.030
Better market access as a result of the protection	0.855	0.055	0.068	-0.019	0.076	0.133
Having rules regarding quality throughout the value chain	0.227	0.857	0.047	0.094	0.081	-0.082
Increased support from the state policies	0.016	0.834	0.132	-0.083	0.043	0.181
Importance of GI registration cost	-0.067	0.200	0.802	0.148	-0.029	0.024
Importance of protecting coffee in the region as a GI	0.097	0.006	0.765	-0.080	0.279	0.044
Micro-climate importance in coffee quality	-0.194	0.105	-0.053	0.864	0.039	0.048
Role of ancestral involvement in coffee production on quality	0.292	-0.109	0.156	0.805	-0.105	-0.038
Importance of having minimum guaranteed returns on coffee	0.005	0.098	0.039	-0.110	0.835	0.027
Importance of information on market price	0.124	0.049	0.401	0.108	0.663	-0.073
Support from administrative office (chiefs, sub-chiefs etc)	0.047	0.068	-0.148	0.128	0.333	0.781
Support from governor's office	0.056	0.025	0.168	-0.083	-0.252	0.837
Eigen value	2.431	1.565	1.498	1.340	1.178	1.027
Percent of total variance explained by each factor	20.26	13.04	12.48	11.17	9.82	8.56
Cumulative percent of variance explained	20.26	33.30	45.78	56.95	66.77	75.33
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	=0.541					
Bartlett's Test of Sphericity Chi-Square (degrees of freedom)	=280.5*** (66)					

***Chi-square test is significant at less than 1% probability

[a] Rotation converged in 6 iterations

[b] Factors extracted using principal component analysis, varimax rotation method with Kaiser normalization

Source: Own survey data (July – August 2015)

Table 3: Factor analysis of producers' perceptions of apple mango as a geographical indication

Variable	Factor[a,b]				
	1	2	3	4	5
Increased extension services	0.747	0.181	-0.081	-0.041	-0.007
Support from administrative office (chiefs, sub-chiefs etc)	0.740	0.022	0.064	0.033	-0.021
Support from governor's office	0.677	0.113	-0.090	0.078	0.229
More participation of the private sector in mango marketing	0.587	-0.325	0.217	0.174	-0.082
Increased support from the state policies	0.101	0.895	0.054	-0.028	0.065
Having rules regarding quality throughout the value chain	0.049	0.863	-0.112	0.090	0.054
Better market prices as a result of protection	-0.024	-0.052	0.873	0.077	-0.046
Better market access as a result of the protection	0.033	-0.015	0.869	0.002	0.019
Importance of receiving information on expected prices	0.021	-0.014	0.008	0.929	-0.132
Importance of cost of GI maintenance	0.191	0.125	0.140	0.664	0.490
Importance of minimum guaranteed mango price	0.030	0.077	-0.049	-0.026	0.934
Eigen value	2.301	1.901	1.453	1.204	1.002
Percent of total variance explained by each factor	20.92	17.28	13.21	10.95	9.11
Cumulative percent of variance explained	20.92	38.20	51.41	62.36	71.47
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	=0.552				
Bartlett's Test of Sphericity Chi-Square (degrees of freedom)	=254.3*** (55)				

***Chi-square test is significant at less than 1% probability

[a] Rotation converged in 5 iterations

[b] Factors extracted using principal component analysis, varimax rotation method with Kaiser normalization

Source: Own survey data (July – August 2015)

4.2 Regression analysis of factors influencing producers' perceptions

The producers' factor scores obtained above were regressed against a set of county-specific explanatory variables. Identical explanatory variables were used across regressions in each county, but the variables varied across the two counties. Significant F-statistics suggests significant explanatory powers of the model denoting that it offers useful insight into the

relationship between the explanatory variables and the latent variables underlying farmers' perceptions.

The regression analysis shows that farmers' perceptions on market-related GI attributes is strongly associated to the respective society and other coffee groups where the producer is a member as well as access to credit. The perceptions on policies and institutions is highly related to membership in coffee society and group, but has a negative relationship to the producers' perception on the importance of the support by the Coffee Directorate. Price related perceptions are also strongly dependent on the coffee society where the producer is a member (**Table 4**). This emphasises the impact of governance of the societies on producers' perceptions and acceptance of geographical indications as a means to market their produce.

Table 4: Regression parameter estimates for coffee producers perceptions

| Explanatory variable | Regression parameter estimates | | | | | |
	Market related	Policies and institution	GI reg attributes	Region characteristics	Price related	Stakeholders
(Constant)	4.433	-2.524	-2.819	-2.100	-2.101	-0.278
	(0.01)	(0.13)	(0.56)	(0.44)	(0.24)	(0.89)
No of coffee bushes	-0.001	-0.001	-0.001	0.001	-0.001	-0.001
	(0.16)	(0.30)	(0.60)	(0.48)	(0.45)	(0.27)
Coffee Society	-0.465**	0.564**	-0.089	-0.221	0.786**	-0.330
	(0.02)	(0.04)	(0.89)	(0.54)	(0.02)	(0.28)
Coffee grp	-2.500**	2.764*	3.323	-3.031	1.982	0.378
	(0.05)	(0.09)	(0.47)	(0.26)	(0.23)	(0.85)
Awareness of unique coffee quality	-0.324	0.693	1.255	-0.556	0.237	1.090
	(0.46)	(0.29)	(0.55)	(0.63)	(0.73)	(0.26)
Consider Coffee directorate support important	1.034	-3.078***	-1.812**	0.744	-2.008*	-0.280
	(0.12)	(0.01)	(0.50)	(0.61)	(0.07)	(0.81)
Price of cherry 2014	-0.009	0.000	0.020	0.080	-0.023	-0.002
	(0.67)	(0.99)	(0.84)	(0.19)	(0.50)	(0.97)
Region influence on coffee Price	0.245	-1.189	-2.286	3.035	-0.837	-0.730
	(0.70)	(0.24)	(0.47)	(0.13)	(0.43)	(0.59)
Access to credit	-2.533***	2.478**	1.836	-1.331	2.755**	1.498
	(0.01)	(0.04)	(0.56)	(0.45)	(0.05)	(0.30)
R-squared	0.967	0.889	0.455	0.700	0.874	0.831
F-Statistic	14.633***	4.013*	0.418	1.164	3.481	2.461
***, ** and * denote statistical significance at 1%, 5% and 10% respectively						

Estimation results for mango regression parameter estimates indicates that perceptions on the importance of stakeholders is highly related to producers' willingness to contribute to the protection of mangoes as a GI and their willingness to have the respective state departments support their efforts to protect the mangoes. Perceptions on policies and rules are rightly

related to producers' willingness to involve state department in the GI registration efforts. Perceptions on price information and minimum guaranteed returns were both highly (and negatively) related to who the producers viewed as the price-setter in the mango subsector. Considering the high perishability of mangoes, as well as limited access to urban and export markets by individual producers, there is need to further identify how prices can be set effectively to benefit the producers (**Table 5**).

Producers' awareness of the uniqueness of the apple mango they grow due to the characteristics of the geographical region was highly related to their perceptions on information on price and the cost of registering the mango as GI. Being a member of a producer association also related with the perceptions on the importance of information on price and cost of registering the GI product as well as the minimum guaranteed returns. Producers' in groups or association are able to benefit from their numbers and set prices and/or invest in protecting their products much easier than producers not in groups/associations. As would be expected, the role of GI in marketing of the products was highly associated with the market related perceptions. However, producers currently receiving information on mango production and prices was not significantly related to any of the factors. This may be due to the fact that the mango industry has a very narrow market outlet and information scarcely reaches producers in time to influence their decision making as noted by Agribusiness Development (ABD).

Table 5: Regression parameter estimates for mango producers perceptions

Explanatory variables	Regression parameter estimates				
	Stakeholders	Policies and rules	Market related	Info on price and cost of GI	Minimum guarantee returns
(Constant)	-5.22	-2.14	1.70	-1.20	-4.46
	(1.91)	(2.00)	(2.21)	(0.66)	(3.35)
Receive info on mango production	-0.20	0.55	-0.59	0.10	-0.45
	(0.32)	(0.34)	(0.37)	(0.11)	(0.56)
Who sets price received by producers	0.07	0.07	-0.11	-0.07**	-0.35**
	(0.10)	(0.10)	(0.11)	(0.03)	(0.17)
Willing to contribute to GI protection?	1.26***	0.45	-0.44	-0.20	1.11
	(0.43)	(0.45)	(0.49)	(0.15)	(0.75)
Awareness of unique apple mango characteristics due to geographical region	0.97	0.35	-0.66	0.76***	0.31
	(0.57)	(0.60)	(0.66)	(0.20)	(1.00)
Sex of HHH	-0.39	-0.21	0.12	0.05	-0.05
	(0.39)	(0.41)	(0.45)	(0.13)	(0.69)
Age of HHH (in years)	0.00	-0.02	-0.01	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)
Gender of HHH	0.09	-0.13	-0.11	0.03	0.09
	(0.22)	(0.24)	(0.26)	(0.08)	(0.39)

Explanatory variables	Regression parameter estimates				
	Stakeholders	**Policies and rules**	**Market related**	**Info on price and cost of GI**	**Minimum guarantee returns**
GI and better marketing	0.52***	0.02	0.52**	0.07	0.08
	(0.18)	(0.19)	(0.21)	(0.06)	(0.32)
Member of producer association	-0.11	0.41	-0.21	0.20**	0.87*
	(0.24)	(0.25)	(0.28)	(0.08)	(0.42)
County govt. support	0.87	0.86	-0.41	-0.25	0.42
	(0.59)	(0.62)	(0.68)	(0.20)	(1.03)
State Dept support	0.77**	-0.95**	-0.08	-0.03	0.52
	(0.33)	(0.35)	(0.39)	(0.11)	(0.59)
R-squared	0.45	0.30	0.21	0.28	0.07
F statistic	3.94***	2.50**	1.96*	2.36**	1.28
***, ** and * denote statistical significance at 1%, 5% and 10% respectively Std. error in brackets					

Of interest is that the characteristics of the household head did not seem to be related to the perceptions of the producers on the role of geographical indications in their respective crops. However, their perceptions are highly related to their view of industry level parameters. Geographical indications as a concept entails protection of products within a given geographical region that essentially and exclusively contribute to the unique quality of the product. The interaction at that landscape level seems to influence producers' perceptions more than their individual characters.

5. Conclusion and policy implication

The analysis has shown produced 6 and five dimensions/underlying factors that summarise producers' perceptions of the role of geographical indications in coffee and mango production. In coffee these factors have been summarised (in descending order of explanatory power) as '*market related*', '*policies and institutions*', '*GI registration attributes*', '*regional specific characteristics*', '*price related*' and '*stakeholder participation*'. Among the mango producers, the factors have been summarised as (in descending order of explanatory powers) '*stakeholder participation*', '*policies and institutions*', '*market-related*', '*information on price and cost of registering the GI*', and *minimum guaranteed returns*. The results of both analysis provide insight on how to better target different products and that have potential to be protected as geographical indications. The differing order of the underlying variables further emphasises the importance of conducting product-specific analysis in identifying the potential of registering different products as geographical indications. The producers in different value chains will also need different interventions towards identifying potential for registering their products as geographical indications.

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