

# **Transaction Costs, Institutions and Smallholder Market Integration: Potato Producers in Peru**

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Integration: Potato Producers in Peru**

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***Abstract***

The paper analyses the impacts of transaction costs on the degree of household market integration using survey data collected from smallholder potato farmers located in the Peruvian Andes. The analysis focuses on the impacts of transaction costs differentiated as information, negotiation and monitoring costs. Two proxies are used to measure the degree of market integration of households, namely quantity sold in the market and sales in large markets. The results show that, in addition to transport costs and market prices, information, negotiation and monitoring costs affect market integration. The study reinforces previous results and sheds light on possible policy options to support smallholders in improving their access to national and global markets.

***Key Words:*** Household behavior and family economics, Organizational behavior, Transaction costs, Property rights, Micro analysis of farm firms, Farm households, and Farm input markets, Agricultural markets and marketing.

***JEL:*** D1, D23, O12, O13.

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# **Transaction Costs, Institutions and Smallholder Market Integration: Potato Producers in Peru**

## **Introduction**

Assessing the impacts of globalisation on smallholders is a topic that has received a lot of attention in the past decade but also has been most difficult to tackle. It is difficult to narrowly define globalization, and moreover, attribute the impacts solely to factors related to globalization.

Globalization is characterized by increasing economic integration, particularly trade and capital flows, between countries. The associated liberalization of trade has enlarged and transformed the input and commodity markets faced by agricultural producers, markedly changing their terms of trade and underlining the importance of international competitiveness.

Smallholders are a heterogeneous group whose resources, livelihood patterns and income sources are quite diverse. Depending on their income sources, their location, other social and/or demographic factors, and the variety of economic and social costs they encounter in their participation in markets, they often have different responses to changes in economic variables and policy actions. Some smallholders are taking part in global markets while some risk exclusion. Therefore, an understanding of the variables that explain smallholder response to globalization is important and can help refine and better target policies.

The paper argues that transaction costs and rural institutions are important in explaining the impacts of globalisation on smallholders due to their impact on the ability of smallholders to access markets beyond the local markets. A survey of transaction costs faced by smallholder potato farmers in Peru is used to identify the types of transaction costs farmers face and how they affect the marketing decisions of the households, both in terms of how much they sell and where they sell. In this context, the analysis shows, as would be expected, that sales are higher where transaction costs are lower and factors other than price affect market integration of households.

The paper starts with a brief overview of the literature on transaction costs and market failures, followed by a description of the data and modeling. The third section discusses the results followed by conclusions and directions for further research.

## **Transaction costs and market integration**

The transaction cost literature goes back to the 1937 article of Coase “Nature of the Firm” where he argues that market exchange is not costless. The cost of a transaction has an important role in the organization of firms and contracts. This line of work has evolved over the years and has become part of a larger framework entitled the New Institutional Economics, as opposed to Institutional Economics. The latter was pioneered by Commons (1931) and Veblen (1898), who argued that institutions played a key role in explaining economic behavior but did not build these arguments around the neoclassical economic model which made it difficult to generalize through rigorous analysis. The New Institutional Economics (NIE) (Williamson, 1993), uses the neoclassical framework, but takes transactions as the unit of analysis, relaxes the hypothesis of perfect information and emphasizes the importance of institutions as a means to reduce high transaction costs. In this context transaction costs are specific to each seller thus implying that each household faces a different price rather than a single market price. The presence of high transaction costs is a cause for thin markets in which participation is low or even for markets to fail completely. Thus, the focus is on the

costs of doing business, although it is not argued that transaction costs alone justify a household's choice of marketing channel.

Existence of transaction costs renders the analysis of household behaviour complex and results in market failures that are household specific, i.e. markets fail to exist for those who have prohibitive costs of transaction (De Janvry et. al, 1991). The spectrum of buying and selling decisions made by the household are based on the difference between the market price and the actual cost faced by the household. Therefore the household becomes a net seller only in cases where the differences in prices are positive. Because of this, pricing policies can have vastly different effects on the welfare of the household depending on whether the household is a net-seller or a net-buyer (Strauss et al, 1997).

The New Institutional Economics (NIE) framework argues that information is not always perfect, that transaction costs can be high and that the costs of undertaking transactions cannot be ignored. Furthermore it is argued that institutions play an important role in economic performance, efficiency and distribution. Therefore NIE relaxes the assumption of perfect information and assumes the additional institutional constraint, thus trying to endogenize the existence of institutions in the analysis of household response. A good review of the NIE literature and its implications for agricultural policy research can be found in Kherallah and Kirsten (2001).

Transaction costs are defined as the "...costs of arranging a contract *ex-ante* and monitoring a contract *ex-post*' ...or more generally the costs of running the economic system" (Hubbard pg. 240, 1997). Transaction costs can be classified as information, negotiation, and monitoring and enforcement costs. Information costs (*ex-ante*) relate to the costs incurred in obtaining information relative to the undertaking of the transaction (price information, market location etc.). Negotiation costs represent the costs incurred while the transaction is being carried out (negotiation terms of exchange, drawing up the contract, etc.). Monitoring and enforcement costs (*ex-post*) are the costs incurred once the transaction is completed and in order to ensure that the terms agreed upon *ex-ante* are kept to (payment arrangements) (Hobbs, 1997).

The problem with the explicit introduction of transaction costs into economic analysis is that transaction costs are difficult to measure in the real world. Little empirical estimation of transaction costs can be found in current literature, even more so in the case of developing countries. Quantitative measurement of market transaction costs and quantification of the impact of institutions still remain as major hurdles when attempting to account for the impact of these costs.

A number of empirical studies have been carried out to better understand the influence of transaction costs on household supply response and marketing behaviour. In general, research articles have slowly clarified the role of transaction costs in household market participation patterns and discuss some country specific examples. Staal et al. (1997) look at milk production marketing failure in Kenya and Ethiopia. The authors find that transaction costs heavily impact and impede commercial production of milk in the study areas. In this context, when institutions are effectively managed they can reduce the toll of transaction costs for both the producers and buyers. Omamo (1998) investigates the reasons for inter-cropping versus efficient cropping in East Africa. The author concludes that market transaction costs represent a barrier to more efficient cropping in East Africa. Goetz (1992) studies the impact of transaction costs in the coarse grain market in Senegal and finds that better information raises the probability of market participation. Gabre-Madhin (1999) investigates the effects of transaction costs on grain trading in Ethiopia and concludes that search costs can considerably constrain grain traders.

Nevertheless, empirical analysis of transaction costs in developing countries still remains very limited. The survey carried out for this study and presented in this paper is a specific attempt to try to account for transaction costs in household marketing decisions and to quantify the consequent impacts of the costs on household decisions.

## The Household Survey

The study presented here uses data collected during a household survey of small potato producers from the Huancayo region of Peru. The survey provides detailed information on transaction costs which is both transaction specific and household specific and was carried out during the harvest year 1999/2000. The survey area was chosen on the basis of diversified market access to local, regional and national markets.

### *The Survey: Location and household characteristics (by household and per transaction)*

The survey area is located in the central sierra region and more specifically in the Huancavelica department. This area lies to the south-east of Lima at an altitude of between 2,500 and 3,500 metres above sea level and counts approximately 1,400 farmer households (the 1994 Agricultural Census identifies 1396 farmers in this area). Information was collected from 244 households, belonging to 13 villages of this area. All households are net-sellers and are mostly potato producers (96.3 %) that sell the majority of their production in the local, regional or central markets. A small percentage of their produce is used for household consumption (8.2 %). Average cultivated area is 3.1 ha with the average for households with bad road access slightly lower than those with better access (2.5 to 3.6 respectively). Household characteristics are shown in Table 1.

**Table 1 : Household characteristics.**

Variable Description	Variable Name	Measurement	
Language	LANG	Language of Household Head (%)	
		Native Speakers	23
		Spanish Speakers	77
Education	EDUC	Education level of Household Head (%)	
		None and initial	5.8
		Primary	68.3
Gender	SEX	Gender of Household Head (%)	
		Female	7.4
		Male	92.6
Plot size	TOTPLOT	Total land coverage dedicated to potato production (Ha)	
		Average Land Plot Size	3.1
		Good Road Access	3.6
		Bad Road Access	2.5

### *The markets*

The potato farmers can choose to sell their produce in several local, regional or central markets. Locally, the farmers can sell their produce at the farm gate, or in local fairs and in the markets of Pichus and Pazos. The regional market is situated in Huancayo, which is a central node for potato sales in the region. The country's central and largest market is located in Lima.

The distance travelled by individual households to reach the markets is very varied and household specific. Average distances travelled by households to reach the diverse markets vary from 0.6 km to 395 km (Table 2).

The markets of Huancayo and Lima are further away (Lima being considerably further) but larger quantities can be sold in these markets and at higher average prices. The largest share of market transactions occur in Pazos (31 %), followed by Huancayo (20.8 %) and the farm-gate (19.9 %), Pichus (16.6%), local fairs (6.5%) and lastly in Lima (5.7%).

**Table 2 : Market distance, quantity and price.**

Market	Average Distance Traveled to Market (km)			Average Quantity per Market (kg)			Average Price per Market (Soles/kg)		
	Bad Road Access	Good Road Access	All	Bad Road Access	Good Road Access	All	Bad Road Access	Good Road Access	All
Farm	0.2	0.7	0.6	1,788	5,336	4,642	0.17	0.2	0.19
Local Fair	6.2	n.a.	6.2	1,440	1,863	1,511	0.2	0.22	0.2
Pichus	23.9	12.5	22.9	1,964	n.a.	1,964	0.23	n.a.	0.23
Pazos	79	22.6	47.8	3,126	4,148	3,624	0.26	0.26	0.26
Huancayo	136.5	84.6	93.1	7,422	9,623	9,243	0.35	0.32	0.32
Lima	472.5	392.3	394.8	22,000	15,300	15,490	0.45	0.41	0.41

Nonetheless we observe that, due to the high discrepancy in prices and quantity sold, the value that can be obtained per transaction in the markets of Lima and Huancayo is considerably higher, even when transport costs are accounted for. Calculations of the average value of transaction<sup>1</sup> show that the average value to be attained in Pichus and Pazos can be as low as 1.7 soles and can go up to 3.2 soles at the farm gate, 6.9 soles in Huancayo and 51.3 soles in Lima (Table 3).

**Table 3 : Number of transactions per market, market share and value of transaction.**

Market	Number of Household Transactions			Market Share and Value of Transaction			
	Bad Road Access	Good Road Access	All	Market Share (%)	Average kilos sold per transaction (kg)	Sale Price minus Transport Costs (Soles/kg)	Average Value of Transaction (Soles)
Farm	54	220	274	19.9	16.9	0.19	3.2
Local fair	74	15	89	6.5	17.0	0.16	2.7
Pichus	207	19	226	16.4	8.7	0.20	1.7
Pazos	193	230	423	30.7	8.6	0.20	1.7
Huancayo	49	238	287	20.8	32.2	0.22	6.9
Lima	2	76	78	5.7	198.6	0.26	51.3
Total	579	800	1,379	100.0	-	-	-

<sup>1</sup> The average value per transaction in a given market is calculated as the product of the average kilos sold per transaction in that market times the sales price minus the transport price, again in that market.

## *The institutions*

Membership in an institution was taken as a household characteristic that facilitates market integration and lowers transaction costs. There are four<sup>2</sup> different institutions to which households belong, namely the Producers Committee, the Association of Farmers, Ronda Campesina and Pronamachs. Pronomachs (“Programa Nacional de Cuencas Hidrograficas y Conservacion de Suelos”, namely the National Programme of River Basins and Land Conservation) is a government programme for small irrigation and land management projects. The Ronda Campesinas are civil society organizations set up in the rural areas. Pronamachs has the largest number of members amongst the households (38.5% of total households), followed by the Producers Committee (29.1 % of total households). Fifteen percent of households belong to the Association of Farmers and thirteen percent to the Ronda Campesinas. Note that, since households may belong to more than one institution, overall household members represent 56% of the sample and non-members amount to 44% of the sample.

## **Analysis and results**

The analysis is based on the following hypotheses:

- Factors that reduce transaction costs effect quantity sold positively.
- Factors, other than price, influence marketing behavior and the level of market integration: transaction costs hinder market integration

### *Definition of transaction costs*

For the purpose of this study we subdivide transaction costs into three categories, namely information costs, negotiation costs and enforcement costs. Information costs are the costs incurred previously to the transaction while attempting to obtain information on the transaction. Negotiation costs are represented by all costs encountered during the set-up of the transaction. And finally, monitoring costs are the transaction costs incurred to monitor and enforce the transaction as agreed. Details of the costs sustained by the farmers under each category are discussed below.

(i) *Costs incurred **BEFORE** the transaction--Information Costs* (Table 4).

Price information can be costly and difficult to obtain, especially in conditions of reduced information flows. The difficulty incurred in obtaining price information can be measured by the time lag between market prices becoming known and the time of sale. In this context rural households were asked with what time difference they discovered price information in the markets (PRICELAG). PRICELAG takes on the value of 0 if price information is obtained at the time of sale and 1 when it is received a number of days before the time of sale.

Incorrect price information is also a cost to the farmer. If the price information is not correct, the rural sellers could mistakenly select a market or transaction and be selling their produce at a lower price, thereby losing some of the possible profit. In the survey the rural households were asked if the actual potato sale price was different from the known sale price. The households reported on the difference between the actual sale price and the known price (PRICEKNOW). For some households the actual sale price was lower than the known market price; for others it was the same or higher.

Previously agreed sales will assist the farmers in lowering the information requirement costs of a transaction. When sales are agreed previously there is no need to find a buyer for the produce and to

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<sup>2</sup> The institutions reported also included Altura Care, a project run under Care Peru, and Communal Businesses. Nevertheless these two institutions were dropped, as only 3 and 1 households respectively reported to be members of the two institutions.

gather price and market information. The relevant variable in the survey differentiates between sales agreed previously to the time of sale and sales agreed at the time of sale (PRICEAGREE).

(ii) *Costs incurred DURING the transaction--Negotiation Costs* (Table 5).

Transportation costs are incurred by the households when transporting the produce to the chosen market and are considered to be negotiation costs when they are specific to the marketing channel chosen. Reporting for transport costs was low and also highly correlated with the road-access variable. Therefore, due to the net separation of survey households into two groups according to their road access, road-access was used to account for diversity in road-access and as a proxy for transport costs (ROADACCESS).

Produce being taken to market can be severely damaged through transportation (DAMAGE) and a large number of farmers responded that damage was considerable and serious. Damage to the produce could cause problems for the farmers to the extent that if the produce is seriously damaged the farmer may no longer be able to sell it once the market is reached.

Time spent at the market waiting to sell the produce is another negotiation cost, given that time spent at the market could be exploited for other activities (WAIT). The time the farmer had to spend in the market could vary from one hour to the whole day.

Farmers can coordinate with one another to organize transportation to reach the market. Coordinated transportation will assist the farmers to reduce negotiation costs during transaction time (COORDINATE).

(iii) *Costs incurred AFTER the transaction--Monitoring and Enforcement Costs* (Table 6).

A monitoring cost is incurred when the farmer has to spend time going to the merchant to obtain the payment for the produce. The number of times that the farmer has to approach the merchant to get paid (TIMESPAY) can vary and as it increases the costs incurred to set time aside to go to the merchant to obtain the payment increase. The number of times surveyed farmers had to go and visit the merchant varied from none to seven.

A second monitoring cost is the loss incurred when the final sale price obtained for the potato sale is less than the sale price agreed (PRICEDIFF). There was considerable variation in the responses of the producers and the final sale price could be less, the same or slightly more than the initially agreed price.

In the survey, farmers were asked if they were able to obtain a receipt for the transaction undertaken with the merchant (RECEIPT). Obtaining a receipt will assist the seller in keeping track of the transaction date and agreed price and also to counteract any future conflicts that may arise. This will allow monitoring and enforcement costs to be minimised.

For the sellers, fulfilment of agreed transactions details is an important characteristic that merchants should have (FULFIL). This will allow cost reductions, by ensuring that the merchant is reliable and attainable to agreement.

Conflicts with the merchants entail delays in receiving payments and other time losses (CONFLICT). If merchants generate conflict over produce quality, the farmers will not be sure that the transaction will be finalised. In this case all previous information and negotiation costs will have been misspent, a new buyer might need to be found and time will have been lost with the wrong buyer.

Confidence in the merchant will assist the farmer in carrying out a smooth transaction and could reduce all transaction costs. Confidence in the merchant will also lower other transaction costs as the farmer will not need to obtain information as to whether the merchant is recognized as reliable. Confidence levels in the merchant varied from low to high (CONFIDENCE).



**Table 4 : Information costs.**

<b>Variable Description</b>	<b>Variable Name</b>	<b>Description</b>	<b>Dummy Value</b>
Time of price information	PRICELAG	<i>When did you find out the sale price</i>	
		At time of sale	0
Difference in price knowledge	PRICEKNOW	Days before	1
		<i>How different was the sale price to the known price</i>	
Time of price agreement	PRICEAGREE	Lower than expected	0
		Similar to what expected, Higher than expected	1
		<i>How was the price agreed</i>	
		At the time of sale	0
		By previous agreement	1

**Table 5 : Negotiation costs.**

<b>Variable Description</b>	<b>Variable Name</b>	<b>Description</b>	<b>Dummy Value</b>
Roadaccess	ROADACCESS	<i>Roadaccess type</i>	
		Bad roadaccess	0
Price negotiation	TIMESNEG	Good roadaccess	1
		<i>Times approached merchant to negotiate price</i>	
Damage due to transport	DAMAGE	None	0
		Various	1
Coordinated transportation	COORDINATE	<i>Level of damage to produce due to transportation</i>	
		Not serious	0
Time lag to sell	WAIT	Serious	1
		<i>Whether the farmer coordinates with other producers to transport</i>	
		Never/Few times	0
		Usually/Always	1
		<i>How long waited to sell produce in market</i>	
		Very quickly	0
		More than two hours	1

**Table 6 : Enforcement costs.**

<b>Variable Description</b>	<b>Variable Name</b>	<b>Description</b>	<b>Dummy Value</b>
Difference between sale and agreed price	PRICEDIFF	<i>Difference between sale and agreed price</i>	
		Less	0
		The same or a bit more	1
Times went to merchant	TIMESPAY	<i>Times had to approach merchant to get paid</i>	
		None	0
		Various times (one or more)	1
Merchant Fulfilment	FULFIL	<i>Level of fulfilment of the merchant in observing agreed payment</i>	
		Bad Record	0
		Good Record	1
Receipt for sale	RECEIPT	<i>Did merchant sign receipt for produce</i>	
		No	0
		Yes	1
Recognition of Quality	CONFLICT	<i>Conflicts because merchant didn't recognize quality</i>	
		No	0
		Yes	1
Confidence in merchant	CONFIDENCE	<i>How confident are you in the merchant</i>	
		Low	0
		High	1

### Transaction costs and quantity sold

The following semi-log model was chosen to test the effect of household characteristics and transaction costs on quantity sold.

$$\text{Log } Q = \beta_0 + \beta_1 \text{ROADACCESS} + \beta_2 \text{PRICEDIFF} + \beta_3 \text{PRICEKNOW} + \beta_4 \text{CONFLICT} + \beta_5 \text{TIMESNEG} + \beta_6 \text{CONFIDENCE} + \beta_7 \text{PRICEAGREE} + \beta_8 \text{LANGUAGE} + \beta_9 \text{MEMBER}$$

The results obtained from the regression are presented in Table 4. From the analysis, access to roads, non-existence of conflicts, confidence in the seller, agreement of price before the transaction and knowledge of Spanish were all found to be significant (at the 5% level) in explaining a higher quantity sold. Knowledge of price was significant at the 10% level (Table 4).

**Table 7 : Market access :Quantity sold in the market.**

<i>Dependent variable: Quantity sold in the market (log of quantity)</i>						
	Coefficient	Standard Error	t	p> t	[95% Confidence Interval]	
Roadaccess *	0.63	0.07	9.33	0	0.50	0.77
Pricediff	0.05	0.08	0.68	0.497	-0.10	0.21
Priceknow **	0.14	0.08	1.81	0.071	-0.01	0.30
Conflict *	-0.38	0.08	-4.97	0	-0.54	-0.23
Timesneg	-0.13	0.09	-1.35	0.178	-0.31	0.06
Confidence *	0.67	0.07	9.38	0	0.53	0.81
Priceagree *	0.32	0.07	4.35	0	0.18	0.47
Language *	0.30	0.08	3.92	0	0.15	0.44
Member	0.02	0.07	0.33	0.738	-0.12	0.16
Constant	7.33	0.14	53.2	0	7.06	7.60

\* Significant at the 5% level

\*\* Significant at the 10% level

### Transaction costs and market integration

It was argued above that an important factor affecting market integration was positive transaction costs, which are factors beyond the market price and specific to households and each transaction.

A qualitative dependent variable model (Probit) was used to test this hypothesis. The qualitative dependent variable was defined as sales in local market (0) vs sales in central market (1) as a proxy for market integration.

$$\text{INTEGRATION} = \beta_0 + \beta_1 \text{PRICE} + \beta_2 \text{PRICELAG} + \beta_3 \text{VARIETY} + \beta_4 \text{COORDINATE} + \beta_5 \text{CONFIDENCE} + \beta_6 \text{TIMESPAY} + \beta_7 \text{DAMAGE} + \beta_8 \text{TOTPLOT} + \beta_9 \text{LANGUAGE} + \beta_{10} \text{MEMBER}$$

The results show that market price is an important determinant of where sales occur (Table 5). Timely information on market prices has a significant impact on market integration as well as the type of variety sold. The probability of selling in a central market increases if farmers are producers of potatoes of the improved variety.

Coordinating transport with other farmers has a significant impact on the probability of selling in a regional or central market. Damage to the produce due to transportation decreased the probability of selling potatoes in the regional or central market.

The results show that, the larger the size of land allocated to potato production, the more likely the farmer is to sell in national markets. Clearly, reaching the national markets is also scale and means dependent. The likelihood of selling in national markets increases with household institution membership possibly due to improved networking and contracts. Market integration is also higher where the seller trusts the buyer. Again, Spanish speakers show a higher degree of market integration than other households.

**Table 8 : Marketing integration : Central and regional versus local sales.**

<i>Dependent variable: Access to regional/central markets vs local markets</i>						
	Coefficient	Standard Error	t	p> t	[95% Confidence Interval]	
Price *	16.78	1.54	10.91	0	13.76	19.79
Pricelag *	1.74	0.20	8.85	0	1.36	2.13
Variety *	0.58	0.20	2.89	0.004	0.19	0.98
Coordinate **	0.36	0.19	1.88	0.061	-0.02	0.74
Confidence	0.00	0.06	0.01	0.993	-0.12	0.12
Timespay	-0.18	0.17	-1.09	0.274	-0.51	0.15
Damage *	-0.45	0.16	-2.71	0.007	-0.77	-0.12
Totplot *	0.17	0.04	4.29	0	0.09	0.25
Language *	0.62	0.22	2.8	0.005	0.19	1.06
Member *	0.43	0.18	2.37	0.018	0.07	0.78
Constant	-7.49	0.73	-10.28	0	-8.92	-6.06

\* Significant at the 5% level

\*\* Significant at the 10% level

## **Conclusions and Implications for policy and research**

The research undertaken in this study has used a survey of actual transaction costs of potato producing smallholders in Peru. As the observations were transaction and household specific, we could analyse the importance of specific transaction costs on quantity sold and the degree of market integration - in this case measured as the ability to sell in larger/national markets. We found that smallholders who were more likely to sell more and in markets that are outside the local area had lower transaction costs related to:

- Better knowledge of price in the market
- No quality conflict with merchant
- Higher confidence in merchant
- Previously agreed contracts
- Good road access
- Timely price information
- Membership in an institution
- Little damage during transport
- Selling the improved variety
- Coordination of transportation with other producers
- Knowledge of Spanish

Transaction costs, by definition are transaction specific and vary from one household to the other. A thorough understanding of the cost of transacting can shed light to policy actions aimed at reducing these costs. Alternatively, an understanding of which smallholders are more likely to be able to reap the benefits of globalization may help target support efforts and better define the kind of support needed.

One limitation of the study is that all surveyed households are net sellers, which excludes those farmers that have not participated in these markets. Further surveys collecting information on transaction costs should aim at having a mix of net sellers and buyers.

An area of future research could be an understanding the characteristics of transactions as well as the institutional governance related to specific transactions. A good example is the global value chains where increased trends in private voluntary standards, is affecting smallholder transactions and the structure and characteristics of markets. The lack of proper information facing smallholders is a positive transaction cost, likely to affect their participation in those markets that demand products with the imposed standards.

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