

# **The adoption of the Eurepgap standard by mango exporters in**

**Piura, Peru**

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## **Abstract**

The significance of standards in international agricultural trade is continuously rising. Due to their complexity, especially private industry standards are often expected to have a negative impact on agricultural export sectors in developing countries. The successful adoption of standards by a broad number of producers can be seen as a condition to limit negative socio-economic consequences.

This case study for the mango export sector in Piura, Peru, analyzes the adoption of the Eurepgap standard, based on a theoretical framework of a compliance process of three stages (information stage, decision stage, implementation stage). The empirical part is based on interviews with farmers. A comparison between certified producers and a control group identifies the mechanisms that lead to an adoption of the standard.

A first major barrier to adoption is the access to information on the standard. Exporting enterprises are the most important source of information. Analysis at the decision stage shows that vertical integration is the most important factor in the adoption of the standard. A contemplation of the implementation stage shows that the costs of compliance are at 9.51 US\$/ton on average or 3.8% of the product price. Factors that influence the costs of compliance are the starting point, the target level and the involvement of exporter enterprises.

Consequently, the activities of exporter enterprises can be identified as the key factor for the adoption of the standard in the sector. Furthermore, the standard involves the risk of exclusion of certain producer groups.

## **1 Introduction**

In recent decades, an ongoing liberalization of international agricultural trade can be observed, which also should provide better export opportunities for developing countries. However, since the early 1980s food quality and safety standards have become increasingly

significant in international agricultural trade (Wilson and Otsuki, 2003) and may counteract the liberalization of agricultural markets.

The question of whether a standard acts as a barrier to trade or not can have severe implications for a developing country's agricultural sector and economy. There is a concern that standards can negatively affect the competitiveness of developing countries and impede actors from these countries from entering high-value food markets (World Bank, 2005 p. ix). This is especially important from a development point of view, as a non-discriminative participation in trade, especially by vulnerable and marginalized groups is often seen as a means to alleviate poverty and improve food security (McCulloch et al., 2001 p. 11).

This paper presents a case study which provides empirical evidence about the adoption of the Eurepgap standard in the mango export sector in Piura, Peru. Mango production in Peru is highly oriented toward the exportation of mango, mainly to North American and European markets. In 2002, mangoes accounted for more than 5% of Peruvian agricultural exports. In recent years, various standards which apply to Peruvian exports of fresh mangos were gradually introduced and continue to be strengthened. The private industry's Eurepgap standard is the most important among these standards and involves the highest cost of compliance for producers. The Piura region, in the North of the country, has a diverse group of mango farmers, offering the opportunity to observe the potential impacts of the Eurepgap standard on various types of producers.

Following a theoretical model of the compliance process based on the concept of the diffusion of innovations by Rogers (1995), this paper analyzes the adoption process with the Eurepgap standard by Piuran mango producers. Based on data from farm interviews in Piura, the mechanisms that lead to and factors that influence the adoption of standards are identified and assessed. Furthermore, the costs of compliance are measured and influencing factors are

determined. Finally, the paper presents an assessment of the possible impact of the standard on the Piuran mango export sector.

## **2 Methodology**

### **2.1 Conceptual framework**

A theoretical base for the compliance process of a standard is provided by Rogers (1995) who developed an explanation model for the diffusion of innovations. According to Chemnitz (forthcoming), the adoption of a quality and safety standard can be considered as the adoption of an innovation and hence can be analyzed following the concept for the diffusion of innovations. For this research, a slight modification of the concept for the diffusion of innovations was used as the conceptual framework.

Accordingly, the process of compliance with a standard is described as a process which consists of three stages: 1) information, 2) decision and 3) implementation (see Figure 1).

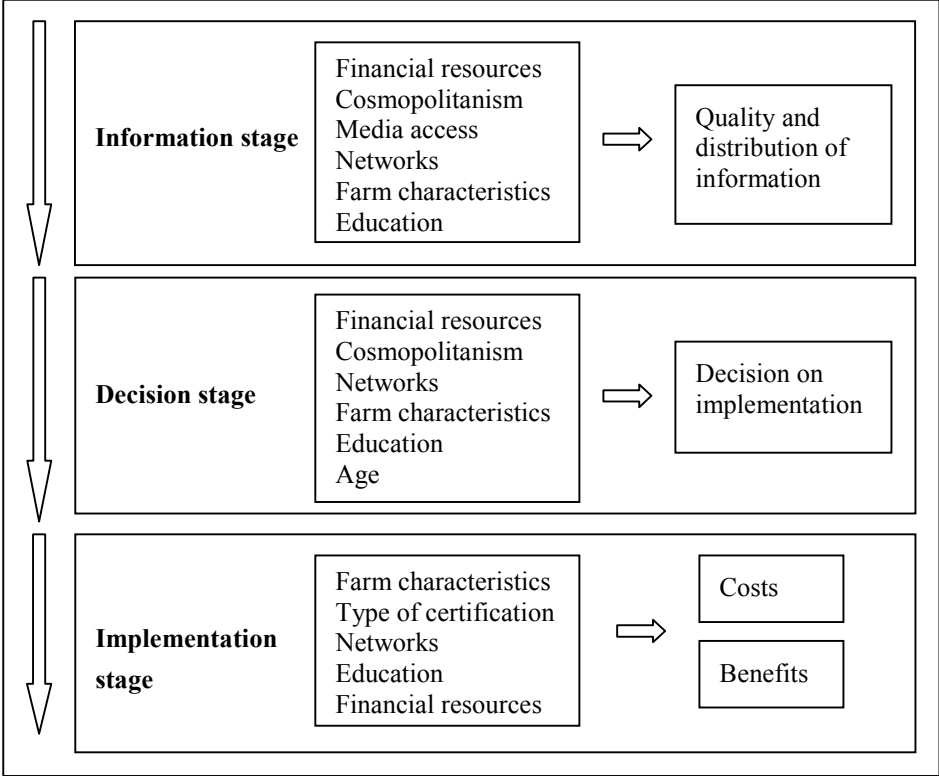
At the first stage the producer obtains information on the standard. He or she becomes aware of the existence of the standard and gains knowledge on how the standard works. The information stage is essential to pass to the subsequent steps of the compliance process, as certain knowledge of the standard is necessary to make a decision.

At the second stage the producer makes a decision on the implementation of the standard. Once the decision to implement the standard is made, the producer enters the implementation stage. The implementation stage consists of the introduction of the standard on the farm. At the end of this compliance process, a producer should comply with the standard and the standard can be considered as adopted.

At each of the stages a dependent variable and influencing factors are assumed. At the information stage, the dependent variable is the quality of information a producer has and by that the diffusion of information among the producers. It is assumed that the quality of

information a producer has on standards is influenced by a number of variables such as financial resources and cosmopolitanism which are listed in detail in Table 1.

**Figure 1: Conceptual framework of the compliance process**



Source: Own figure based on Rogers (1995).

At the decision stage the dependent variable is the actual decision a producer has taken toward an implementation. It is assumed that the decision is influenced by a set of socio-economic characteristics such as farm characteristics and education which are listed in detail in Table 2.

Once the decision to implement the standard is made, the producer enters the implementation stage of the compliance process. At this stage, the paper presents the costs of compliance, generated by the standard on the farm level, and gives an overview on the perceived problems and benefits of the implementation of the standard, which can be included in a broader concept of costs of compliance and constitute a first step toward a cost-benefit analysis.

The costs of compliance are disaggregated into two elements: recurrent costs and non-recurrent costs. To calculate the annual costs of compliance, the non-recurrent costs are

depreciated annually and added to the recurrent costs on an annual basis. In order to keep the results comparable among farms, the costs of compliance were calculated on a per ha and a per output unit basis.

To analyze possible determinants of the costs of compliance, the factors listed in Table 3 such as farm size and the type of certification were tested for correlations with the level of the costs of compliance.

## **2.2 Research area**

The data collection of the research was carried out in San Lorenzo in Piura, Peru. In San Lorenzo, of a total area of 57,500 ha about 12,000 ha are cultivated with mango (Portal Peru Rural Piura, 2005) which shows the high importance of mango export production in the region. The sector has a highly diverse structure in terms of farm size, farm type and socio-economic characteristics (Fort et al., 2001 pp. 27 ff.).

## **2.3 Research design and data collection**

The sample for the interviews which were conducted in 2004/05 was selected out of the total population of producers registered by the National Agrarian Health Service (SENASA) as being producers of mangoes for exportation. Out of a population of 2,451 producers producing mango for exportation in general and a group of 80 Eurepgap certified producers a stratified sample was taken. The first stratum consists of producers with Eurepgap, the second contains producers without Eurepgap. For the first stratum, 28 producers were selected out of the Eurepgap group applying a snowball system. For the second stratum, 33 producers were selected out of the registry of SENASA by simple random selection.

The stratification of the sample by the outcome variable “compliance with Eurepgap” leads to an *ex-post facto* research design. The design allows the comparison of the group of producers complying with Eurepgap to a reference group which is representative for the mango export sector in San Lorenzo.

## **2.4 Data analysis**

For the analysis of the results at the information stage, qualitative analysis is used to evaluate the quality of information producers have on the standard. To describe the distribution of information among the producers, descriptive statistics are applied. The analysis of factors that may have an influence on information access is performed using t-test and Chi<sup>2</sup>-test.

At the decision stage, qualitative analysis for the analysis of reasons for and against certification is combined with t-tests and Chi<sup>2</sup>-tests to analyze possible influencing factors.

The monetary costs of compliance are calculated for each farm and presented as annual costs per ha and annual costs per ton. The costs of compliance per output unit are calculated based on the average yield in Piura from 1997 to 2002.

Factors that possibly influence the costs of compliance are analyzed applying t-test and correlation analysis. To determine perceived problems and perceived benefits of applying the standard, qualitative analysis is applied.

## **3 Results**

### **3.1 The information stage**

The main result at the information stage is the distribution of information within the sector. In order to describe the diffusion of information, two quality categories of information are created. The first category, "sufficient knowledge", contains producers that can be expected to have enough knowledge to start with an implementation. The second group, "insufficient knowledge", consists of the remaining producers.

The analysis of the distribution of information within the sector reveals a large information gap. Out of 61 producers, 33 have sufficient and 28 insufficient knowledge. The comparison of the two groups shows that there are clear differences between the producers with respect to socio-economic characteristics (see Table 1).

**Table 1: Test results for variables explaining “sufficient knowledge of the standard”**

| Explaining variable  | Test variable                                    | Significance level of $\chi^2$ - or t-test                           |
|----------------------|--|--|
| Networks             | Member of producer organization                  | +++  |
|                      | Vertical integration: contract farming or higher | +++  |
| Cosmopolitanism      | Journeys to Piura > once a week                  | +++  |
|                      | Journeys to Lima > once a month                  | 0  |
|                      | Residence not on farm                            | +++  |
| Media access         | Telephone > once a week                          | +++  |
|                      | Internet > once a week                           | +++  |
| Education            | Level of educational attainment of the farm head | Higher in case of sufficient knowledge, but not statistically tested |
| Farm characteristics | Farm size  | +++  |
|                      | Commercial orientation of the farm               | Higher in case of sufficient knowledge, but not statistically tested |
| Financial resources  | Total amount of revenues                         | ++   |

+:  $p \leq 0.10$ ; ++:  $p \leq 0.05$ ; +++:  $p \leq 0.01$ ; 0 = not significant.

Results indicate a possible influence of these factors on the access to information and suggest that the problems in accessing information can be traced back to limitations caused by socio-economic constraints.

But despite of the observed differences, among those producers with sufficient information also such can be found who are not members of producer organizations, less cosmopolite, without access to telephone or internet and with a lower educational attainment, own small, semi-commercial family farms and dispose of little financial resources. The only unambiguous variable is vertical integration. Producers with sufficient information in no case have a vertical integration lower than contract farming, i.e. none of them sells to an intermediate.

This observation goes in line with the findings from the analysis of the information channels. 22 out of the 33 producers with sufficient knowledge declared to be provided with information on the standard by an exporter enterprise.

Consequently, one can conclude that the access to information states a first major barrier to the adoption of the standard, as many producers are impeded from proceeding in the



compliance process through a lack of the necessary knowledge. It is also shown that typically poorer and smaller producers are disadvantaged in accessing information. Nevertheless, most shortcomings that originate from socio-economic constraints can be overcome by the activities of exporter enterprises. Thus, vertical integration can be seen as the most important influencing factor for the access to information.

### **3.2 The decision stage**

The research at the decision stage consists of an analysis of the reasons in favor and against certification with the standard and a comparison of the producers with respect to the socio-economic characteristics that *ex-ante* have been considered to influence the decision. For the analysis a subset of 46 cases is used, excluding those who could not give reasons for their decision due to a lack of information. Out of this sample, 28 producers have decided in favor and 18 producers against implementation.

The analysis of the decision making shows that a proactive approaching of producers to the standard rarely occurs. The idea of an implementation is rather brought to producers by the exporter enterprises and the decision is mostly made at the instance of these enterprises. Correspondingly, most producers said that the standard was implemented because it was either required by the buyer or, more generally, by international markets. Out of the 46 producers, all in all 30 mentioned one or both of these reasons. Other reasons in favor of implementation, such as the opportunity for farm improvement or a possible commercial advantage through the standard play a minor role. Decisions against implementation in five cases were explained by the lack of financial resources. Also five producers mentioned they would implement the standard as soon as it would be obligatory. Other reasons were given all in all four times.

Similarly to the information stage, the analysis of possible influencing factors shows clear differences between the producers (see Table 2).

**Table 2: Test results for variables explaining decision “in favor of certification”**

| Explaining variable  | Test variable                                    | Significance level of $\chi^2$ - or t-test                        |
|----------------------|--|---|
| Networks             | Member of producer organization                  | ++  |
|                      | Vertical integration: contract farming or higher | ++  |
| Cosmopolitanism      | Journeys to Piura > once a week                  | ++  |
|                      | Journeys to Lima > once a month                  | 0   |
|                      | Residence not on farm                            | ++  |
| Farm characteristics | Total farm size                                  | +++   |
|                      | Mango area                                       | +++   |
|                      | Commercial orientation of the farm               | Higher in case of decision in favor, but not statistically tested |
|                      | Number of cultivars                              | 0   |
| Financial resources  | Total amount of revenues                         | ++  |
|                      | Credit use                                       | +   |
|                      | Amount of credits                                | 0   |
| Education            | Level of educational attainment of the farm head | Higher in case of decision in favor, but not statistically tested |
| Age                  | Age  | +++   |

+:  $p \leq 0.10$ ; ++:  $p \leq 0.05$ ; +++:  $p \leq 0.01$ ; 0 = not significant.

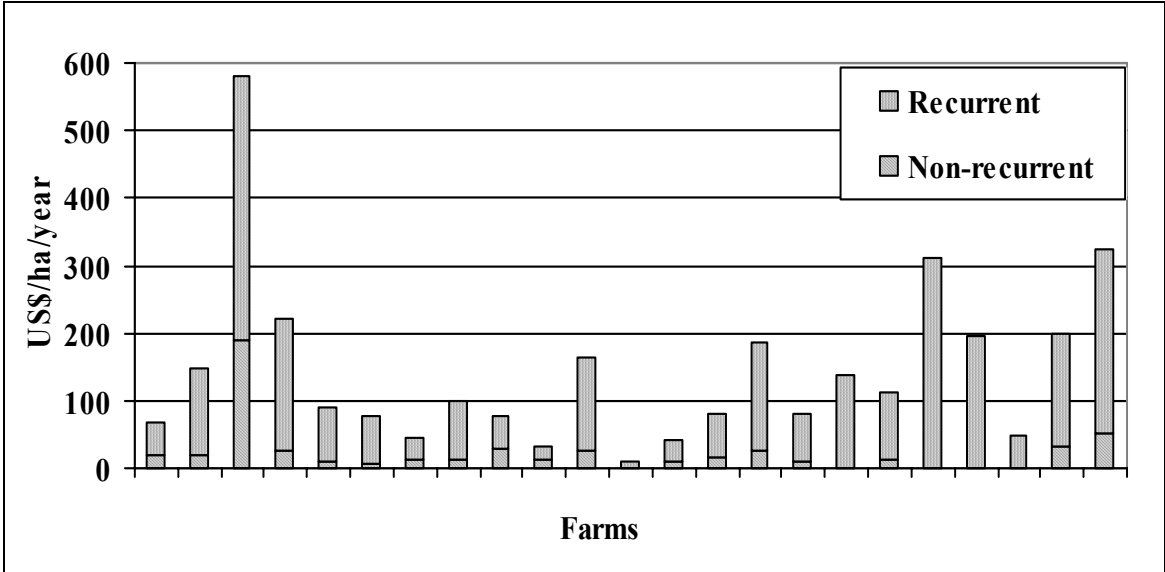
But as already observed at the information stage, the only variable that appears to be necessary for a favorable decision is the vertical integration. Among the producers who decided positively, no producer can be found with a vertical integration lower than contract farming.

The results at the decision stage again point to a key role of the exporter enterprises in the adoption process. First, a favorable decision is mostly explained by the requirement of the buyer. Second, the vertical integration offsets the effect of other possible influencing variables.

### 3.3 The implementation stage

At the implementation stage, the costs of compliance are measured, influencing factors are determined and producers' perceptions of problems and benefits the standard brings about for the farm is looked at.

**Figure 2: Annual monetary costs of compliance**



Source: Own calculations.

As Figure 2 shows, the costs of compliance range between 10 and 580 US\$/ha/year, accounting for 145 US\$/ha/year on average. Calculated on a per ton base, the costs account for 9.51 US\$/ton/year and range from 0.65 US\$/to and 38.08 US\$/ton. In relation to the farm gate price, the costs of compliance add up to 3.8% in the mean, ranging from 0.3% and 15.2%. That means that the costs of compliance can, at least in single cases, result in a considerable economic burden.

A striking point is the large variability of the costs of compliance. With the large range and a correspondingly high standard deviation of 127 US\$/ha/year the data raises the question of factors that influence the amount of the costs of compliance. Contrary to the previous assumptions, no significant relation between the expected influencing factors and the costs of compliance of producers could be found (see Table 3).

**Table 3: Test results for variables explaining the level of the costs of compliance**

| <b>Explaining variable</b> | <b>Test variable</b>                             | <b>Significance level of t-test or correlation analysis</b> |
|----------------------------|--|---|
| Networks                   | Member of producer organization                  | 0   |
|                            | Vertical integration: contract farming or higher | Not tested  |
| Type of certification      | Individual or group certification                | 0   |
| Farm characteristics       | Total farm size                                  | 0   |
|                            | Commercial orientation of the farm               | 0   |
| Financial resources        | Total amount of revenues                         | 0   |

+:  $p \leq 0.10$ ; ++:  $p \leq 0.05$ ; +++:  $p \leq 0.01$ ; 0 = not significant.

Alternatively, three other explanations for the variability of the costs of compliance can be specified. First, the costs are influenced by the starting point, i.e. the difference between the technical level of the farm before implementation and the technical level required by the standard. Second, the target level, which is the technical level the producer aspires to with the implementation, influences the costs of compliance level. The target level largely depends on individual factors, like for example the personal conviction of the farm head about the standard. Third, exporter enterprises again play an important role, as the enterprises often support producers in the implementation of the standard and by that overtake some costs, thus allowing the producers to externalize certain cost items and lower the farm's costs of compliance.

The assessment of perceived problems and benefits shows that the most common problem caused by the standard are the elevated costs. Other problems are of a minor importance and involve difficulties related to the practical adaptation of the farm to the standard and problems in understanding the regulations. The perceived benefits are more manifold. Producers reported an increase of productivity, better marketing conditions, an elevation of knowledge of workers and farm owners and improved working conditions. Furthermore, higher product quality, better farm hygiene, improved relations to other producers and an improved infrastructure were mentioned. In general, producers who had implemented the standard saw a

positive cost-benefit ratio, i.e. in most cases the elevated costs and some inconveniences with the implementation were paid off by the benefits provided by the standard.

#### **4 Conclusion**

This analysis of the compliance process allows drawing a number of conclusions on the adoption of the standard and its diffusion as well as on its possible impact on the sector.

A first important result is the observation that the first impediment for the adoption of the standard is the access of information by the producers. The majority of the producers are not even able to do the first step toward compliance as they do not obtain the necessary information.

The second important finding is the important role of the exporter enterprises for the adoption of the standard by the producers. Despite of clear differences between the producers with respect to a number of socio-economic characteristics which point to a possible influence of these factors on the adoption, the role of the exporter enterprises appears to surmount their significance. By providing the necessary information to producers, influencing the decision making and supporting the producers in the implementation, the exporter enterprises turn into the key factor for the adoption of the standard and its diffusion.

This strong role of the exporter enterprises has to be assessed ambiguously. On the one hand, the enterprises support poorer and smaller producers which otherwise would not be able to comply with the standard to obtain a certification and run the risk of being excluded from the lucrative European markets. On the other hand, the standard can lead to an increased dependency of producers on the enterprises. First, exporter enterprises in many cases are the holder of the certificate. By that they gain a monopsony position for exports to markets requiring the standard which involves the risk of the payment of prices below the competitive equilibrium to producers. Second, the standard leads to a more intense involvement of the

enterprises into the farm management which can result in a loss of independence of producers.

In general, the little initiative of producers toward an adoption and the lack of actors other than the exporter enterprises that support the diffusion of the standard involves the risk of the exclusion of those producers from the Eurepgap markets which are not considered by the enterprises to be worthwhile to obtain a certification.

A striking observation is the heterogeneity of the costs of compliance observed among farms and the insignificance of the *ex ante* determinants tested. This poses a challenge for future investigation into the determinants as well as for refinement of the method for data collection on costs of compliance.

A final conclusion can be drawn regarding the standard's impacts on the development of the sector. With respect to the observation that the standard on the one hand helps certified producers to raise their productivity and by that their competitiveness and on the other hand entails the risk of exclusion of certain producer groups it can be expected that the standard leads to a consolidation of the value chains. These consolidated value chains are likely to include the more competitive producers but may exclude other producers. As the producers in risk of exclusion were typically already in advance the more disadvantaged, this can imply negative effects on income distribution in the region, resulting in adverse poverty impacts.

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