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Impact of productivity on exports: Case of the grape in Peru, 2007-2017

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Resumen

El Perú, en los últimos 10 años ha venido experimentando un crecimiento casi constante en las exportaciones de algunos productos del sector agrícola que cuentan con gran aceptación en el mercado internacional. Dentro de los productos más demandados encontramos a la uva, que se exporta en cantidades importantes hacia Estados Unidos, China, Países bajos, Rusia, España, entre otros. Aunque se han estado presentando básicamente problemas de orden climatológicos, la producción ha seguido una dirección alentadora, mejorando su productividad cada año, siendo los departamentos Piura, Ica, Lima, Lambayeque y La Libertad, los más representativos en cuanto a su producción se refiere. En este escenario, en donde los mercados internacionales se abren gracias a los convenios y tratados firmados, las exigencias hacia los productores se incrementan, siendo la productividad el principal indicador de mejora continua, midiendo los avances en conocimiento, técnicas y especialización, generando mayor producción y mejor calidad. Analizar el impacto de la productividad en la exportación, permite tener una idea de las relaciones de causa efecto entre uno y otro, permitiendo dar mayor énfasis a las estrategias para generar mejoras. El análisis estadístico realizado, mostró que existe un impacto importante de la productividad en la exportación, de tal manera que por cada tonelada adicional incrementada en la producción por hectáreas cosechada, las exportaciones se incrementan en 36,819 toneladas. Este hecho debe ser considerado, ya que la dedicación y el impulso que se otorgue a mejorar la productividad tendrá resultados muy positivos en las exportaciones.

Palabras clave: Producción, Uva, Importación, Exportación, Productividad, Impacto.

Abstract

Peru, in the last 10 years has been experiencing an almost constant growth in the exports of some products of the agricultural sector that have great acceptance in the international market. Among the products most in demand are the grapes, which are exported in significant quantities to the United States, China, the Netherlands, Russia, Spain, among others. Although they have been presenting basically climatological problems, the production has followed an encouraging direction, improving its productivity every year, being the departments Piura, Ica, Lima, Lambayeque and La Libertad, the most representative as far as its production is concerned. In this scenario, where international markets open up thanks to agreements and treaties signed, the demands on producers increase, with productivity being the main indicator of continuous improvement, measuring advances in knowledge, techniques and specialization, generating greater production and better quality. Analyzing the impact of productivity on exports, allows us to have an idea of the cause-effect relationships between one and the other, allowing greater emphasis on strategies to generate improvements. The statistical analysis carried out showed that there is a significant impact of export productivity, so that for each additional tonne increased

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in production per hectare harvested, exports increase by 36,819 tons. This fact must be considered, since the dedication and the impulse that is granted to improve productivity will have very positive results in exports.

Keywords: Production, Grape, Import, Export, Productivity, Impact

1. Introduction

Productivity is one of the basic elements of competitiveness among individuals, companies and countries. To increase productivity it is necessary to review and increase the knowledge of the people involved in an ongoing manner, thereby improving procedures, the use of resources, innovating new techniques and improving existing ones. This concept is of vital importance, not only because of the results obtained, but also because it generates a better quality of life for society (Herrera, 2013).

Peruvian agriculture has shown positive changes in productivity in recent years, being very considerable for products that are destined for export. One of the contradictory aspects is that productivity varies significantly from one region to another, including from one type of producer to another, due to the varied characteristics and conditions in which farmers find themselves, in such a way that producers can be distinguished that produce on a large scale, being the destination of their production export markets, on the other hand we find producers who own small smallholdings, often unproductive, only with the orientation to subsistence and without any search for connection to the markets (World Bank, 2017).

The grape has the tariff heading 0806100000 and has become in recent years one of the main export products of our country, especially for its great acceptance in the world market. Within the main grape producing countries are China, the United States, Italy, Spain and France, so the consumption of this product is very common within their territories, however, there are periods of counter season in which they leave to produce, opening important commercial windows for export.

Peru has advantages in the climate and disposition of suitable agricultural lands for its sowing of the grape, which has generated that the internal production behaves in a remarkable way, in addition, the process of commercial opening and the signing of commercial treaties with others countries have opened new markets and opportunities, which suggests that it is convenient to invest in their planting (Ministry of Agriculture and Irrigation, 2017).

According to the classical theories of international trade, it is always beneficial for one country to trade with another, especially when it has absolute advantages, comparative advantages or some differentiating element. The production oriented to the international market forces the producer to go beyond the planning for the internal production, it is to think about overcoming the normal levels of production, it is thinking on a large scale, constantly improving the productivity, increasing the specialization and installing the concept of continuous improvement in production (Houck et al., 2014).

The search for increases in grape exports leads to improved production, increase productivity, increase cultivation areas and improve quality, surpassing market demands, sanitary and phytosanitary standards required by SENASA (Gamarra et al. 2017).

Peru has absolute advantages in the production of grapes, so it is convenient to specialize in their production, has climatic advantages, adequate growing areas and good location in the hemisphere. These reasons allow it to be very efficient in the production of the various existing varieties, which is why you can see specialized crops in the departments where they are sown, such as Ica, Piura, Lima, Lambayeque, La Libertad, Arequipa, among others (Salvatore, 1995).

The analysis of productivity and its impact on the export of the grape allows to determine the importance of productivity in exports, relying on the statistical technique called linear regression could predict future situations with different scenarios, which allows to have an idea of the changes that would be experienced to improve the variables that generate the impact (Veliz, 2011).

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The study has been carried out on the basis of information extracted from the Ministry of Agriculture and the Trade Map, as well as adequate theoretical foundation that support the coherence of the approach, since all analysis requires fundamentally the empirical identification of dependent and independent variables, locate a consistent database for its adequate analysis and a logical explanation of the relationship between both analysis variables (Mendoza, 2016).

2. Materials and Methods

This research is of the applied type and was elaborated using the non-experimental quantitative approach, of explanatory level, the data have been extracted from databases of sources of the Ministry of Agriculture and Trade Map. Initially, a descriptive statistical analysis was carried out based on tables and graphs, followed by an inferential analysis based on the simple linear regression model. The study was carried out based on the records of the yield in kilograms per hectare of the grapes grown in the national territory (productivity of the grape) and the exports made from Peru to the world, between 2007 and 2018. The data obtained they are elaborated based on a documentary analysis extracted from the aforementioned databases.
The proposed model was:

$$VE = \beta 0 + \beta 1 * PU + Ɛ \quad (1)$$

Where:
VE: Exported grape volume
PG: Grape Productivity
Ɛ: Random error
β0: Constant
β1: Coefficient

3. Results

Table 1 shows the productivity per hectare and Volume exported from Peru to the World between 2007 to 2017.

Table 1. Productivity per hectare and Volume exported from Peru to the World, 2007 - 2017

Years	Grape productivity Tons/hectare	Exported volume Tons
2007	16.11	26,115
2008	16.86	44,104
2009	18.96	60,727
2010	18.70	78,015
2011	17.92	122,065
2012	17.62	149,216
2013	20.18	177,605
2014	21.50	268,386
2015	22.44	314,707
2016	24.69	294,263
2017	21.66	269,270

Source: Trade Map

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Table 2 shows the test of normality of both analysis variables, being the level of significance of 0.208 for the exported value and 0.780 for the productivity per hectare, indicating with this, that there is normality for the data shown since 2007 to 2017

Tabla 2. Test of Normality for the variables Productivity of the grape (PG) and Volume exported (VE)

	Shapiro-Wilk		
	Statistic	gl	Sig.
VE	0.904	11	0.208
PG	0.961	11	0.780

Table 3 shows the goodness-of-fit test of the model, indicating that the R squared has an acceptable level, in such a way that the variability of the export is explained by the variability of the productivity.

Table 3. Goddness of fit Model

Model	R	R square	Adjusted R square	Std. error of the estimate
1	,906[a]	**0.820**	0.800	47985.913

a. Predictors: (Constant), PG

b Dependent variable: VE

Table 4 shows the significance test of the model, being 41.059 for the value of F, with a significance less than 0.05, so it is possible to affirm that the model is significant.

Table 4. ANOVA

Model		Sum of Squares	gl	Mean Square	F	Sig.
1	Regression	94543671601.673	1	94543671601.673	41.059	,000[b]
	Residual	20723830674.327	9	2302647852.703		
	Total	115267502276.000	10			

a. Predictors: (Constant), PG

b Dependent variable: VE

Table 5 shows the significance test of the model coefficient, obtaining a value of 6.408 for the t statistic and a level of significance less than 0.05, so that the coefficient is significant within the model.

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Table 5. Statistical significance

Model		Unstandardized Coeficients		Standarized Coeficients	t	Sig.
		B	Std.. Error	Beta		
1	(Constante)	-560996.982	114072.541		-4.918	0.001
	Productivity	36819	5.746	0.906	6.408	0.000

a. Dependent variable: VE

4. Conclusions

According to the results obtained, there is an impact of productivity on exports, so that for each increase in productivity by one tonne per hectare, exports will increase by 36,819 tons.
The impact of productivity is significant and allows obtaining an important estimate of the importance of productivity in exports, both increasing and decreasing, which is why it is an aspect of vital importance.

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