

## **Diseño experimental aplicado al análisis de ventaja competitiva en agronegocios: modelo de Porter**

Experimental design applied to competitive advantage analysis in agribusinesses: porter's  
model

Villalobos Gracia Irma Arisbel<sup>1</sup>, Magaña Magaña José Eduardo<sup>1</sup>✉, Villarreal Ramírez Victor Hugo<sup>1</sup>,  
Hernández Salas José Esteban<sup>1</sup>, Hugo Armando Morales Morales<sup>1</sup>, Luisa Patricia Uranga Valencia<sup>1</sup>

<sup>1</sup>Facultad de Ciencias Agrícolas y Forestales–Universidad Autónoma de Chihuahua.

✉ Autor para correspondencia: [emagana@uach.mx](mailto:emagana@uach.mx)

**Recibido:** 20/02/2018

**Aceptado:** 10/06/2018

### **ABSTRACT**

The present article discusses and utilizes an experimental design that applies SPSS in a lineal regression in which competitiveness represents the dependent variable and technology, commercialization, and exports are the independent variables. The experimental design consisted in analyzing the variables running through a "Godness of Fitness", to one another and compared to the dependent variable. Thus, the model allows for analyzing the correlation levels of each variable adjusted to the Godness of Fitness.

**Keywords:** Competitiveness, Spss, Experimental Design, lineal Regression, Goodness of Fitness.

### **RESUMEN**

El presente artículo discute y utiliza un diseño experimental que aplica SPSS en una regresión lineal en la que la competitividad representa la variable dependiente y la tecnología, la comercialización y las exportaciones son las variables independientes. El diseño experimental consiste en analizar las variables que se ejecutan a través de una "Godness of Fitness", entre sí y en comparación con la variable dependiente. Por lo tanto, el modelo permite analizar los niveles de correlación de cada variable ajustada a Godness of Fitness.

**Palabras clave:** Competitividad, Spss, diseño experimental, regresión lineal, bondad de la aptitud.

### **INTRODUCTION**

The conceptual term of competitiveness was firstly established in the 16th century according to the theories of international trade based upon the several comparisons among the countries. The theoretical framework was introduced by 17<sup>th</sup> Century

over the coming to international trade by that time, competitive advantages covered the richness produced by a given country based upon the economic factors of production, namely, labor, capital and land. Up to now the literature review on competitiveness touches regional

development that covers the environmental agenda nowadays. Thus, the current definition of competitiveness is defined as the global economic objective that touches on the social, environmental, political and institutional traits to make up for the sustainable development (Patricia Rojas, Sergio Sepúlveda, 1999).

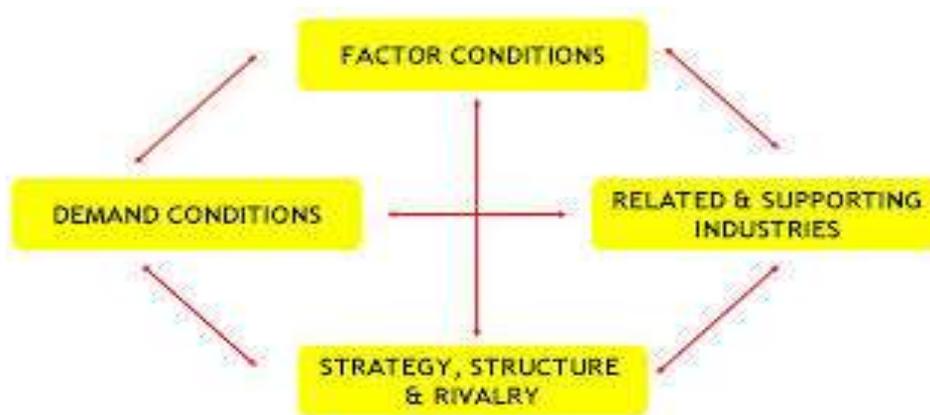
According to Cuervo (1993), Fernández (1993), Salas (1993), and Galán and Vecino (1997), the competitiveness is conformed by:

- a) Macroeconomics: Correlations among the economic issues that affect the competitiveness of firms, such as exports, interest rates, exchange rates, inflation, employment, and supply and demand of the economy.
- b) Free Market: Best known as open market, out of monopolies

that affect the competitiveness of firms, such as supply and demand, commerce of goods and services in a competitive market.

- a) Entrepreneurship: Also known as the competitiveness of firms as a result of their inner organizations and productivity, cutting edge technology and some other cultural features

Michael Porter defines competitiveness as added value that is produced per labor unit. This conceptualization refers to firms where added value is produced in a given market. Thus, from a macroeconomics approach the national diamond is referred to as the production factors that determine the national competitiveness. This diamond is drafted up by Porter as follows:



**Figure 1.** The figure is taken by Porter (1990), establishing four factors that determine the level of competitiveness of a given firm.

The figure is taken by Porter (1990), establishing four factors that determine the level of competitiveness of a given firm;

- a) Factor conditions: (land, capital, labor and technology). Those determine the capacity to produce

and acquire new technologies that allow for export competitiveness.

- b) Demand conditions: Domestic demand as percentage of gross domestic product to guarantee a constant inflow – outflow of

- c) production and consumption in the economy.
- d) Strategy, structure and rivalry of firms: The productive structures is made up by firms in several sizes, that means, free market is conducted by free participation of firms into the market.
- e) Supporting conditions: Entrepreneurship as a function of institutions, cultural traits, and cutting edge technology.

Thus, competitiveness is divided by three categories

- a) Macroeconomics: Exports that gear up the world competitiveness of a given country
- b) Meso-economics: Group cooperations at local levels, contributing to sustainable demand and supply in every single economic sector, through stockholders, traders, producers, households, governments, firms and brokers
- c) Microeconomics: Economic growth rises up due to technology which is added up for competitiveness improve, translated into better capacities for the firms, organizations skills and entrepreneurship and know how, generally speaking

As a primary objective, the present article is intended to probe Porter's Model, competitiveness as a function of Technology, Exports and Trade.

As secondary objective, it was run three lineal regressions in SPSS in order to prove Porter's Model, reaching put for the best goodness of fitness.

## METHODS

The methods applied to competitiveness measure exports, trade, and technology. The last three variables are independent. The linear regression approaches use SPSS to explain proportional relations, covariances matrix, descriptive analysis and distribution diagrams. The lineal regression allows us to establish the correlation among the variables in a given equation. It is also known as multiple regression when it comes multiple variables that explain a single one.

In order to measure competitiveness, this work explains in a multiple regression analysis, the goodness of fitness in experimental designs. Thus, that means how near are the events from a regression line, which is known as goodness of fitness.

The methodology used a correlation matrix with all of the variables, the independent and the dependent variables, giving a result  $R^2$  equal 0.27. which shows in what way the dependent variable is explained by the independent variables.

In order to do an analysis of experimental designs, it was necessary to run a second lineal regression with no all independent variables as in the first regression. Thus, technology is set out of the model, so that commercialization and exports determine competitiveness. A third one regression was to explain how competitiveness is explained by technology only.

In the model number 1, it is showed that there are some residuals presenting homostedasticity due that the residual are equally distributed all along the goodness of fitness.

The composition of the variables are: competitiveness, which is defines the quantity of dollars as a result of a sustainable economic growth, technology, defines as the capacity of innovation of firms in the production process, commercialization, defined as the number of transactions inside or outside a given región. Finally, the exports, defined as those transactions to the rest of the region.

It is important to point out that for the purpose of this paper, the commercialization will be the transactions made inside the región between the firms and exports outside the región. Thus, there

will be a downgrade relationship between commercialization and exports, as shows in SPSS.

The number of events are the several firms located at the agroindustrial mennonite community of Cuauhtémoc, Chihuahua, Mexico. The number of firms were 303, in the economic sectors of cooper, woodens, commodities, groceries and milky products.

### RESULTS

Competitiveness of the variables (comercialization, technology and exports).

### Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Competitividaddllspordia	16657.89	8749.085	303
Tecnologíaindice	30.34	14.653	303
Comercializaciónnumtransaccordia	763.33	843.836	303
numdeExportacionespordia	30.34	14.653	303

The first regression shows that the average of firms to produce moonthly incomes of US 16,657 with a standard deviation of US 8,749. In other words, the firms export 30

units per month and trade 763 units. Thus, most of the units are merchandise in the same region, namely, the agroindustrial community.

### Correlations

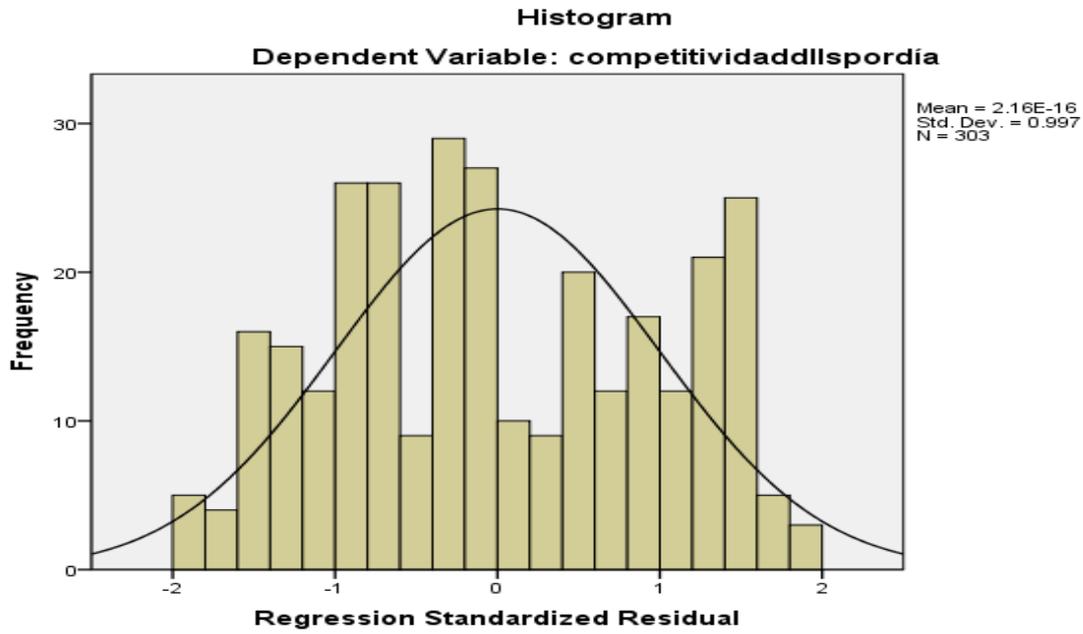
	Competitividaddllspordia	tecnologíaíndice	comercializaciónnumtransaccordia	numdeExportacionespordia
Competitividaddllspordia	1.000			
tecnologíaíndice		1.000		
comercializaciónnumtransaccordia			1.000	
numdeExportacionespordia				1.000

Pearson Correlation	Competitividad ordía	1.000	-.160	-.086	-.160
	Tecnología índice	-.160	1.000	.314	1.000
	Comercialización mtransacc ordia	-.086	.314	1.000	.314
	numdeExportaciones ordia	-.160	1.000	.314	1.000
Sig. (1-tailed)	Competitividad ordía	.	.003	.067	.003
	Tecnología índice	.003	.	.000	.000
	Comercialización mtransacc ordia	.067	.000	.	.000
	numdeExportaciones ordia	.003	.000	.000	.
N	Competitividad ordía	303	303	303	303
	Tecnología índice	303	303	303	303
	Comercialización mtransacc ordia	303	303	303	303
	numdeExportaciones ordia	303	303	303	303

The regression of matrix show a proportional upgrade relationship between commercialization and technology, and the commercialization and exports.

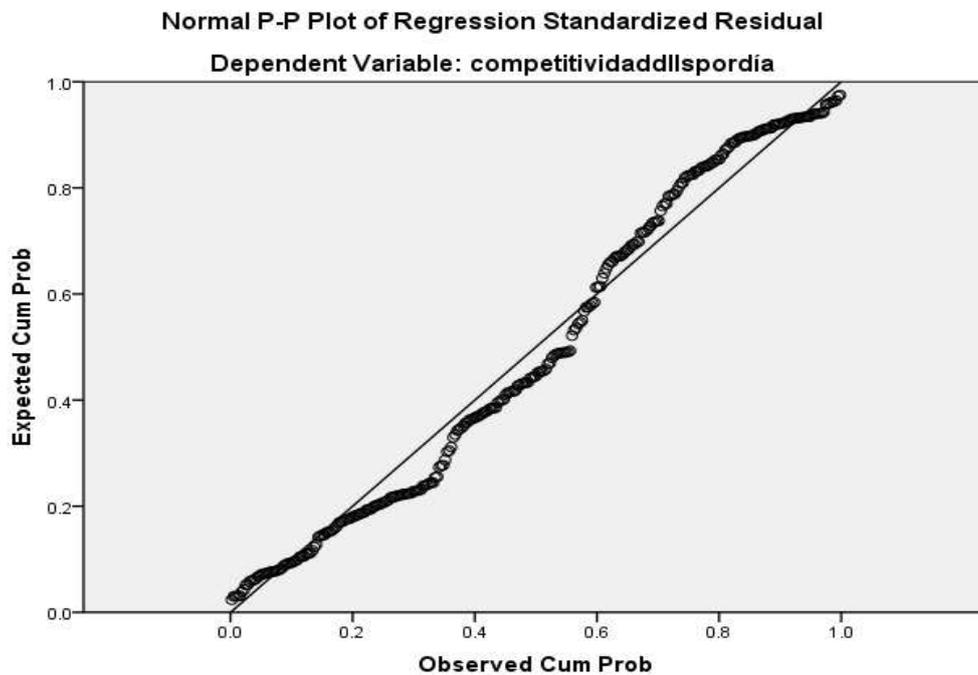
The level of which the dependent variable is explained by the independent variable

(competitiveness), in this case R<sup>2</sup>, and the Durbin Watson is explained by the proportion of variables that come out of the model and they try to explain how far the tendencies are far away from the goodness of fitness. The frequency distribution of competitiveness is 0.997.



The scatter plots are the residuals and are known as those data outside the goodness of fitness, showing in what way the

exportes deviate from the goodness of fitness.



**Competitiveness measured by commercialization and exports.**

**Regression**

**Descriptive Statistics**

	Mean	Std. Deviation	N
Competitividaddllspordía	16657.89	8749.085	303
Comercializaciónnumtransaccpordia	763.33	843.836	303
numdeExportacionespordia	30.34	14.653	303

The data shows that descriptive data shows that in a second run, setting out the variable of technology, under the same number of data N, and a standard deviation as sales in dollars

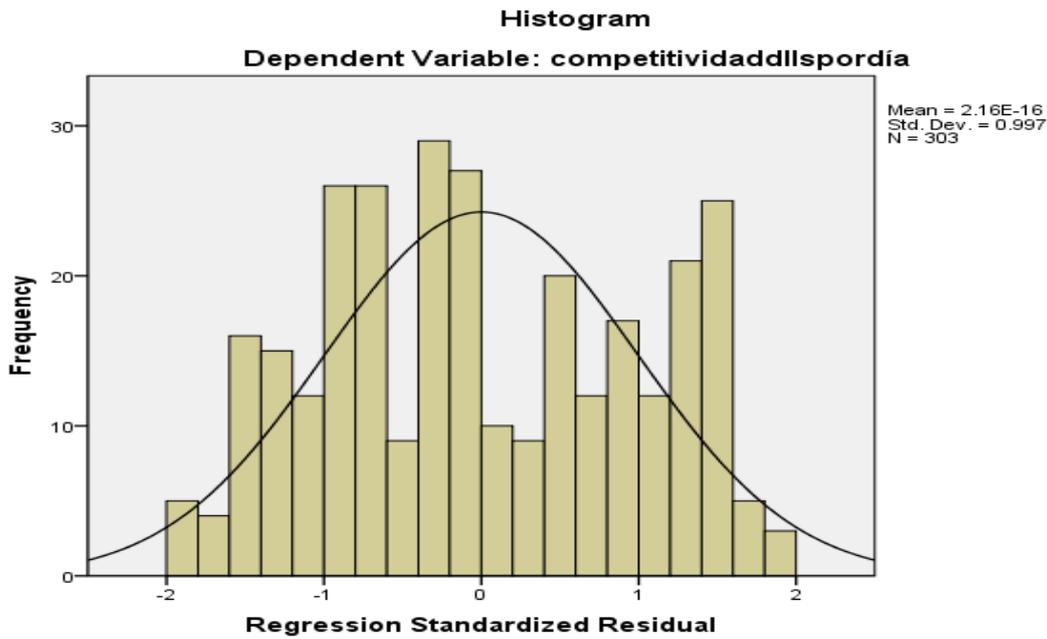
(Competitiveness) by 8749, out of 843, which represents the inner trade on that region and barely 14 number of exports.

**Correlations**

		competitividad dllspordía	comercialización numtransaccp ordia	numdeExportac ionespordia
Pearson Correlation	Competitividaddllspordía	1.000	-.086	-.160
	Comercializaciónnumtrans accpordia	-.086	1.000	.314
	numdeExportacionespordia	-.160	.314	1.000
Sig. (1-tailed)	Competitividaddllspordía	.	.067	.003
	Comercializaciónnumtrans accpordia	.067	.	.000
	numdeExportacionespordia	.003	.000	.
N	Competitividaddllspordía	303	303	303
	Comercializaciónnumtrans accpordia	303	303	303
	numdeExportacionespordia	303	303	303

The correlations features portrays direct relationships between the commercialization and the number of exports which is barely 0.314. Thus, there is no relationship at all between these two

variables, so, in that term, seemingly and as the case might be, some products are domestic trade and some others are out of town, turning into exports.



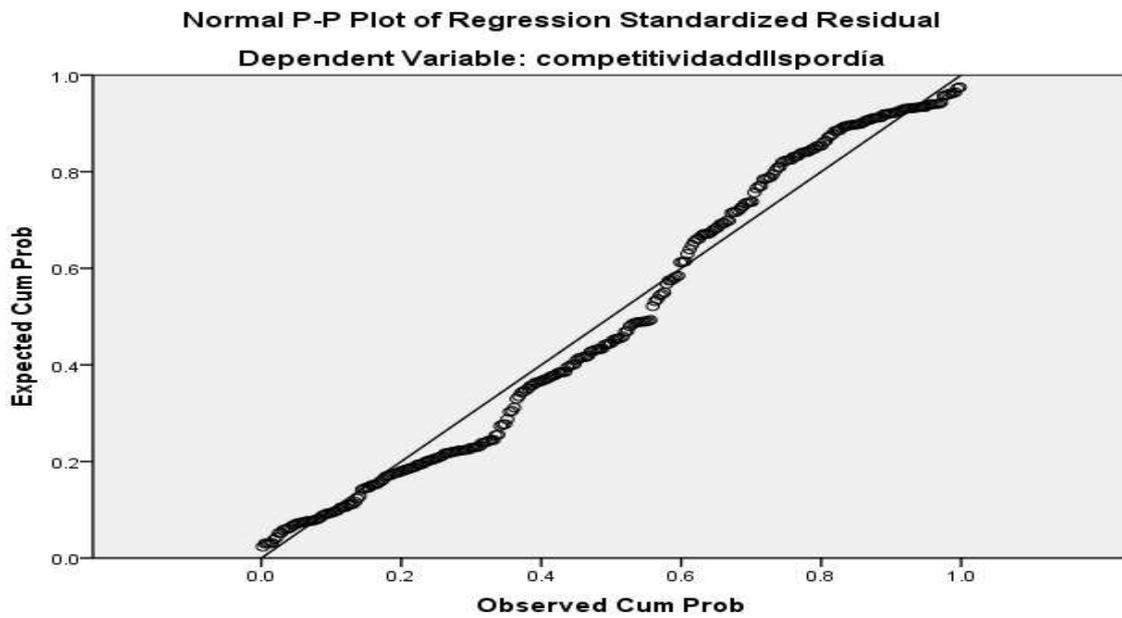
**Coefficient Correlations<sup>a</sup>**

Model			numdeExportacionespordia	comercialización numtransaccordia
1	Correlations	numdeExportacionespordia	1.000	-.314
		Comercialización numtransaccordia	-.314	1.000
	Covariances	numdeExportacionespordia	1282.668	-6.997
		Comercialización numtransaccordia	-6.997	.387

a. Dependent Variable: competitividadallspordia

The frequency distribution by firm fits into a normal distribution with standard deviation of 0.997

As observed, the residual scatterplots found a linear regression and exports tendencies are as expected.



## Competitiveness and Technology

### Regression

#### Descriptive Statistics

	Mean	Std. Deviation	N
competitividaddllspordia	16657.89	8749.085	303
tecnologíaíndice	30.34	14.653	303

The last but not least important regression is to show monthly incomes by 16657dollars, averaging a gap of 8749 dollars, which is, de desviación estándar. Thus, firms are expected to export 30 units

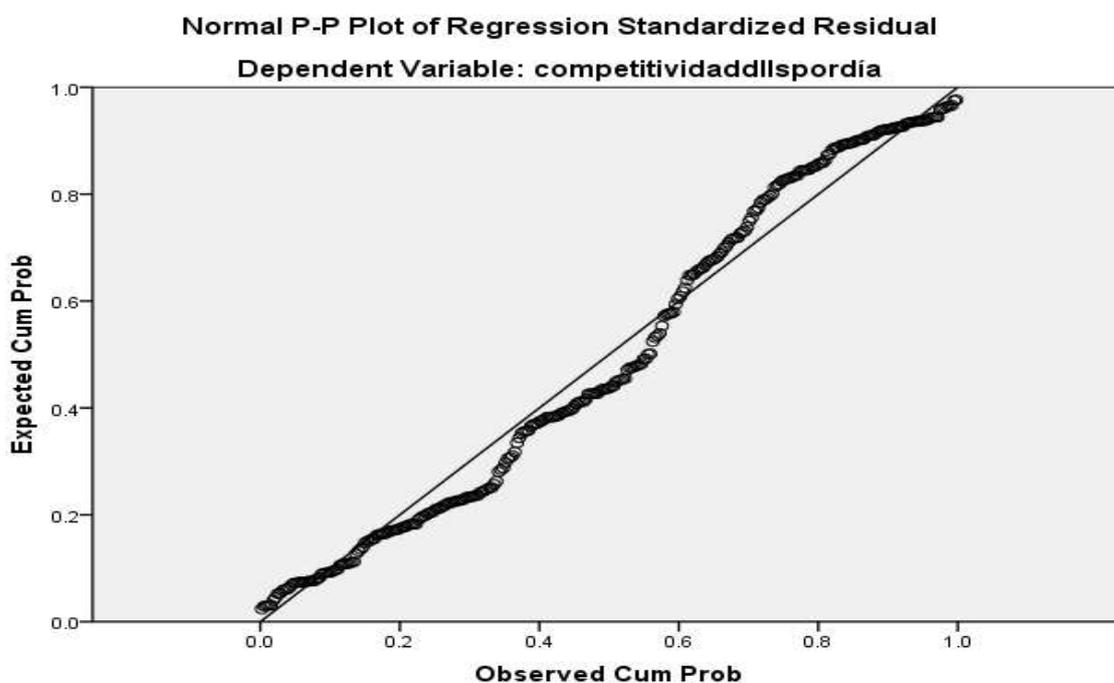
per month and traded at home 36 units, and so that most of the merchandises are traded innerly all along the domestic producers, vendors and salers.

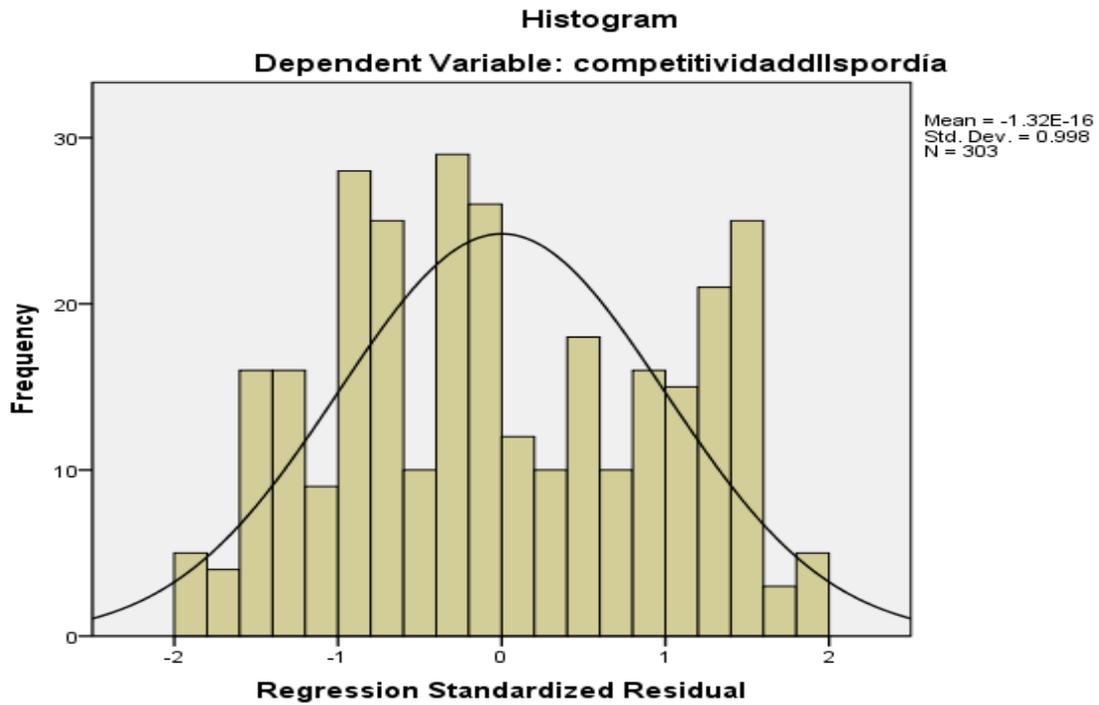
**Correlations**

		competitividaddlla spordía	tecnologíaíndice
Pearson Correlation	Competitividaddlla spordía	1.000	-.160
	Tecnologíaíndice	-.160	1.000
Sig. (1-tailed)	Competitividaddlla spordía	.	.003
	Tecnologíaíndice	.003	.
N	Competitividaddlla spordía	303	303
	Tecnologíaíndice	303	303

The frequency distribution has a standard deviation that equals the latter run and it is

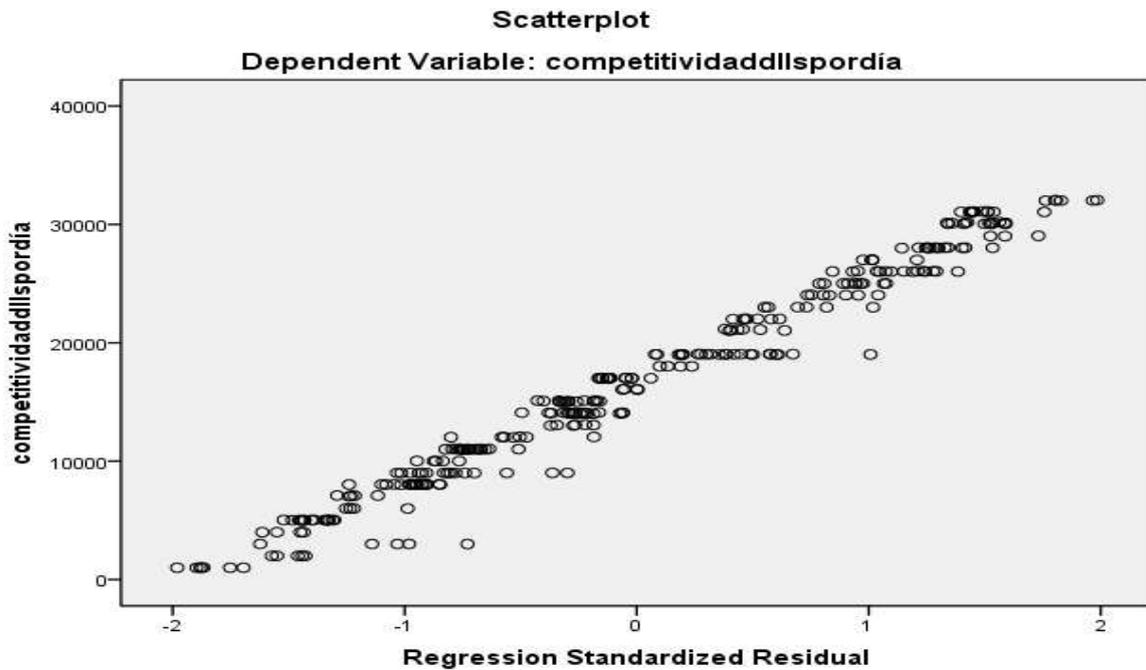
observed an slightly distribution towards minus cero.





The scatter plot funnel is merely concentrated towards the godness of fitness, which is the best one model that

perfectly explains the theory of competitiveness between two variables



## CONCLUSIONS

The three models are adjusted to the godness of fitness. Thus, three models could explain the Porter's theory in terms of competitiveness of agribusiness sectors depending on exports, technology use, and commercialization.

## REFERENCES

Dominguez Villalobos, Lidia. "Transferencia de tecnología y capacidades tecnológicas: El caso de la industria electrónica". *Investigación Económica* 204, abril - junio de 1993. pp 113 – 141.

Galdos Cálculo y estadística III Edición única. Grupo la República. Lima Perú; 2005.

Cannavos G. *Probabilidad y Estadística Aplicación y Métodos*. Ed. Español McGraw Hill. México, 1995.

Cal, Bouzada / Verdugo Matés Guía de introducción a la econometría utilizando Shazam Professional. Modelo de regresión lineal múltiple. Disponible en: [http://uknowledge.uky.edu/gradschool\\_dis/482](http://uknowledge.uky.edu/gradschool_dis/482)

Porter, Michael E. (1990); "The competitive advantage of nations", *Harvard Business Review*, marzo – abril de 1990. (Harvard – Deusto Business Review, cuarto trimestre de 1990).

Copyright (c) 2018 Irma Arisbel Villalobos Gracia, José Eduardo Magaña Magaña, Victor Hugo Villarreal Ramirez ,

José Esteban Hernández Salas, Hugo Armand Morales Morales y Luisa Patricia Uranga Valencia



Este texto está protegido por una licencia licencia [Creative Commons 4.0](https://creativecommons.org/licenses/by/4.0/).

Usted es libre para **Compartir** —copiar y redistribuir el material en cualquier medio o formato— y **Adaptar** el documento —remezclar, transformar y crear a partir del material— para cualquier propósito, incluso para fines comerciales, siempre que cumpla la condición de:

Atribución: Usted debe dar crédito a la obra original de manera adecuada, proporcionar un enlace a la licencia, e indicar si se han realizado cambios. Puede hacerlo en cualquier forma razonable, pero no de forma tal que sugiera que tiene el apoyo del licenciante o lo recibe por el uso que hace de la obra.

[Resumen de licencia](#) - [Texto completo de la licencia](#)