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Export Performance of Copra in India – A Time Series Analysis

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Abstract: Copra is one among the coconut products, the kernel of the fruit of the coconut palm (Cocos nucifera). Copra is valued for the coconut oil extracted from it and for the resulting residue, coconut-oil cake, which is used mostly for livestock feed. Copra export occupies significant position in terms of quantity as well as value position in export earnings among the coconut products. In recent years, there have been ups and downs in export of copra from India. In this study was conducted to analyze export performance of copra in India. The required data collected for the period of 10 years. The annual common growth rate in terms of quantity and value were positive. Estimates trend of copra of quantity and value in India for the period of 2006-07 to 2015-16. It was resulted that the slightly fluctuated. On the basis of fitted trend. The growth was analysed the direction of causality between time and quantity, value of copra export. The findings indicate a strong relationship between the dependent and independent variables.

Keywords: copra, export, trend, Quantity, value, Causal Relationship, Co-integration and linear regression

INTRODUCTION

The coconut palm [Cocos nucifera L.] is an important fruit tree in the world, providing food for millions of people, especially in the tropical and subtropical regions, and with its many uses it is often called the "tree of life".

India ranks as the third largest coconut-producing country in the world. Copra, the dried edible part of coconut is produced after drying of coconut. It is estimated that nearly 36-40 per cent of coconuts are utilized for the production of copra. Export earnings from the coconut industry consistently registered the highest among that of all other agricultural commodities. Copra and coconut production provides employment, income and a key source of nutrition for the majority of the rural population.

In the coconut industry, drying the coconut meat reduces its moisture content that inhibits the growth of bacteria and the action of enzymes that causes spoilage. The coconut meat is named copra once drying starts. Copra is mainly produced by small coconut holders using sun-drying or smoke-kiln methods in India. Copra is available in two different forms - edible copra and milling copra. While edible copra is prepared in the form of balls and cups, milling copra is prepared in the form of cups and chips. In Kerala, lion's portion of copra traded is milling copra from which coconut oil is extracted. There are about 75 per cent of copra is exported from Kerala. The oil so extracted is put mainly to industrial use. Therefore, in this paper examine the export performance of copra exporting from India.

Literature Review

There are number of studies related coconut in India. But there are limited studies available for coconut products. Abdulnasser Hatemi-J and Manuchehr Irandoust [1] in his paper anlaysed the export performance and economic growth Causality. They summarised the established bidirectional causality suggests that the expansion of exports is an Integral part of the economic growth process. Sanusi [2], in his study applied the both descriptive statistics (co-efficient of variability) and inferential statistical tools (growth rate model; quadratic time trend model) were used to analyse the data and also applied the instability analysis of rice production. Karthick. v, *et al.* [3] studied the export performance of ginger in India. They are concluded that the export growth of post WTO period in terms of quantity and values were found to be not significant and declining but unit price value were found to be significant and positive. Nominal protection coefficient was found to be more than one indicates the non profitability of export Maneesh P, and Deepa N.R [4], found that trends in area, production and productivity of rice in Kerala. Trend equation in the time series analysis is based on least square method. Richard Paul.V, and Savitha. P,[5] in their paper concluded that the economic growth was analysed the direction of causality between GDP and construction in public, private corporate and house hold

sector. The findings indicate a strong relationship between the dependent and independent variables. Richard Paul.V, and Radha devi.S,[5] in their paper analysed the trend analysis that the trend in area, production and productivity of paddy cultivation. It resulted that the negative trend for the years

RESEARCH METHODOLOGY

The secondary data regarding quantity and value of the copra export were collected from coconut development board, Kerala and the various journals. The temporal analysis is based on the 10 years starting from 2004-05 to 2013-14. The entire analysis was done by the use of SPSS. Statistical tools were used for identifying the export performance of copra.

The co-efficient of variation was estimated by using the following formula:

$$\text{Coefficient of variation} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

To calculate compound annual growth rate, divide the value of quantity and value at the end of the period in question by its value at the beginning of that period, raise the result to the power of one divided by the period length, and subtract one from the subsequent result.

This can be written as follows:

$$\text{CAGR} = \left(\frac{\text{Ending Value}}{\text{Beginning Value}}\right)^{\left(\frac{1}{\#\text{ of years}}\right)} - 1$$

The trend analysis was worked out using linear model and secular trend models. The secular trend function was finally selected to explain the trend due to its superiority over others in terms of coefficient of multiple determinations (R^2).

The secular Trend model is log Y = a+bt

Where

Y = Quantity and value of the export of the copra.
a = Constant
t = Time in years
b = Regression coefficient

In this model, the growth rate will be (bx100) in terms percentages [6, 7].

The general form of the equation of multiple linear regression is:

$Y_i = \beta_o + \beta_1 . X_i + \beta_i \times + \beta_2 .X_{i,2} + \ldots . + \beta_k . X_{i,k} + \varepsilon$

and

i = 1,2,…..,n are the observations from the sample;

Y_i = observation *i* of the dependent variable;

$X_1, X_2, \ldots, X_k$ = independent variables;

B_0 = constant(free term of equation);

$B_{1,}, \ldots \beta_k$ = coefficients of independent variables;

ε = error term of equation.

As research method, it was applied the backward method of linear regression (which consists of frequentative elimination of independent variables which have the most insignificant influence to dependent variable) into SPSS (Statistical Package for the Social Sciences) program (method tested on Table 2).

The variables are: – time for what was verified the correlation as dependent variable; quantity and value of export of copra, independent variables

Trend and Descriptive Statistics in Quantity and Value of Export of Copra in India

In order to find out the variation in quantity and value of copra in all the years, coefficient of variation analysis was used (Table.1). It was observed that the variation in copra is high compared to quantity and value of export performance.

Table – 1: Export of Copra in India from 2006-07 to 2015–2016

Year	QTY				Value			
	(in MT)	Increase/ Decrease	% of Increase / Decrease	Trend Value	(Rs.in Lakhs)	Increase/ Decrease	% of Increase / Decrease	Trend Value
2006-07	1356.84	--	--	9980.04	521.67	--	--	3607.2184
2007-08	1671.46	314.62	23.19	10380.65	539.53	17.86	6.53	4267.8787
2008-09	13578.00	11906.54	712.34	10781.26	5580.07	5040.54	11.06	4928.5391
2009-10	22997.16	9419.16	69.37	11181.86	9113.03	3532.96	-2.61	5589.1995
2010-11	16927.18	-6069.98	-26.39	11582.47	8820.5	-292.53	0.84	6249.8598
2011-12	17619.23	692.05	4.09	11983.08	11380.6	2560.10	-2.63	6910.5202
2012-13	17282.03	-337.20	-1.91	12383.69	8715.91	-2664.69	-1.43	7571.1805
2013-14	11957.24	-5324.79	-30.81	12784.29	7243.52	-1472.39	-2.27	8231.8409
2014-15	7689.45	-4267.79	-35.69	13184.90	8594.46	1350.94	3.48	8892.5013
2015-16	6749.21	-940.24	-12.23	13585.51	5292.61	-3301.85	1.13	9553.1616

Source: Calculated Value.

It is inferred from Table 1 that the export of copra quantity and value had registered a fluctuating trend during the period of study. It reveals that the quantity of copra from 1,356.84 mt (2006-07) to 22,997.16 (2009-10)mt and 521.67 lakhs (2006-07)to 9113.03(2009-10).

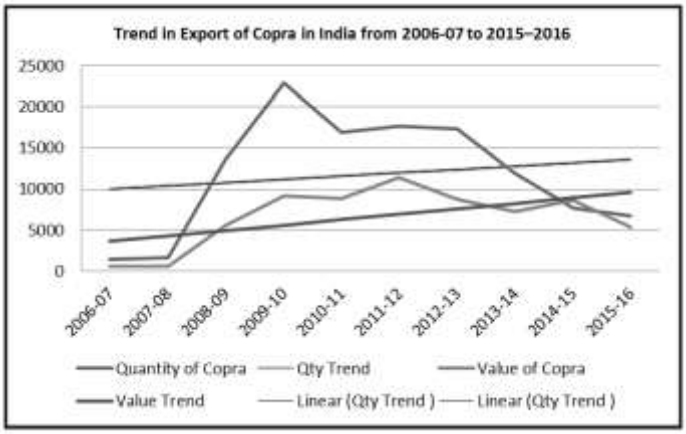

Fig – 1: **Trend and Descriptive Statistics in Quantity and Value of Export of Copra in India**

In order to find out the variation in quantity and value of export of copra in India all the years, coefficient of variation analysis was used (Table.2). It was observed that the variation in quantity and value of export of copra in India is sustainable growth. Quantity and value of export of copra in India is compared with years the quantity increased as well as the value is increased.

Table – 2: Descriptive Statistics and Growth of Copra in India

Copra	Mean	SD	CV	ACGR
Quantity (in MT)	11782.78	7248.12	162.56	**15.42**
Value (Rs.in Lakhs)	6580.19	3642.19	180.67	**28.72**

Source: Computed value

The result shows that trend quantity and value of export of copra in India. It is observed from the table that all the period, the growth is positive value. If the quantity is increase spontaneously value is increased significantly.

The linear regression: a relationship between the quantity and value of export of coconut in India with Time series Data

The linear regression is based on the calculation of the correlation coefficient for the all the variables group, the correlation between a dependent variable and the others independent variables being analysed. If the correlation coeffient has a value approaching 1, this means that the correlation is strong. The aim of using the linear regression is to determine what impact on the economic growth has the independent variables such as quantity and value of export of copra. The optimal method used for the linear regression model is the backward method, which is based on the elimination, at every step of iteration, of the independent variable which has the weakest influence on the dependent variable. None of the independent variables were removed, as it is shown in Table 4. From the Table 5, there can be observed that among the variables, it is a good correlation, but not very strong, because the correlation coefficient is 0.779. In addition to this value, none of the independent variables have been removed, so all these variables have a significant relationship on time series.

The significance is below 0.05, which means that there are small errors determined by chance. As a remark, the total credit influence on the time series is very good and strong (sig =0.000), and the tolerance is 0.288, greater than 1-Adjusted R square (1–0.494=0.506), which eliminates the uncollinearity risk. VIF (Variance Inflation Factor = 1/Tolerance) also helps for the collinearity analysis, being able to warn about an uncollinearity situation if its value has a greater value than 4.

Table-3: The Correlation Co-Efficient and the Significance for the Dependent and Independent Variables

		Time	Quantity (in MT)	Value (Rs.in Lakhs)
Pearson Correlation	Time	.844	1.000	.167
	Quantity (in MT)	1.000	.844	.549
	Value (Rs.in Lakhs)	.549	.167	1.000
Sig. (1-tailed)	Time	.001	.	.322
	Quantity (in MT)	.	.001	.050
	Value (Rs.in Lakhs)	.050	.322	.
N	Time	10	10	10
	Quantity (in MT)	10	10	10
	Value (Rs.in Lakhs)	10	10	10

Table – 4: Variables Entered/Removed [a]

Model	Variables Entered	Variables Removed	Method
1	Quantity , Value [b]	.	Enter

a. All requested variable entered
b. Dependent Variable: Time.

Table – 5: The correlation Coefficient Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.779[a]	.606	.494	2.15457	1.500

a. Predictors: (Constant), Quantity, Value b
b. Dependent Variable: Time

Table – 6: The linear Regression coefficient model parameters

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	2.811	1.472		1.910	.098		
Quantity	.000	.000	-1.028	-.326	.053	.288	3.473
Value	.001	.000	1.417	3.205	.015	.288	3.473

In our case, VIF is 1.472, which also eliminates the uncollinearity risk. Thus, using the coefficients calculated (column B – Table 6), the linear regression equation obtained is: quantity 0.00 , and value 0.001. The interpretation of coefficients from regression equation points out that, considering data for the period 2004–2006-07 to 2015-16, on a short period of time, it is expressed the following correlations: if quantity increases with one point, then value of copra growth rate decreases with 0.00 percent and if value of copra increases with one percent, then copra growth rate decreases with 0.001 percent.

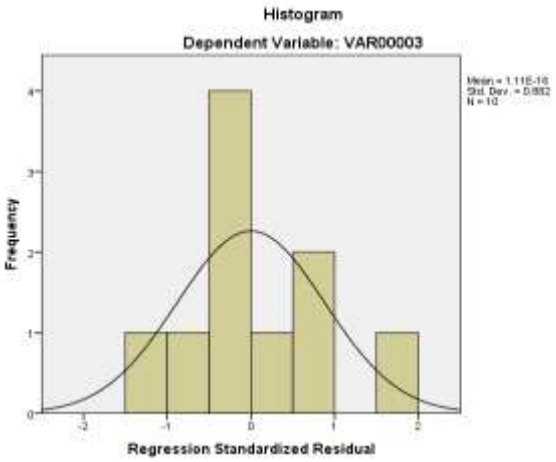

Fig – 2

In statistics, a P–P plot (probability–probability plot or percent–percent plot) is a probability plot for assessing how closely two data sets agree, which plots the two cumulative distribution functions against each other. P-P plots are vastly used to evaluate the skewness of a distribution.

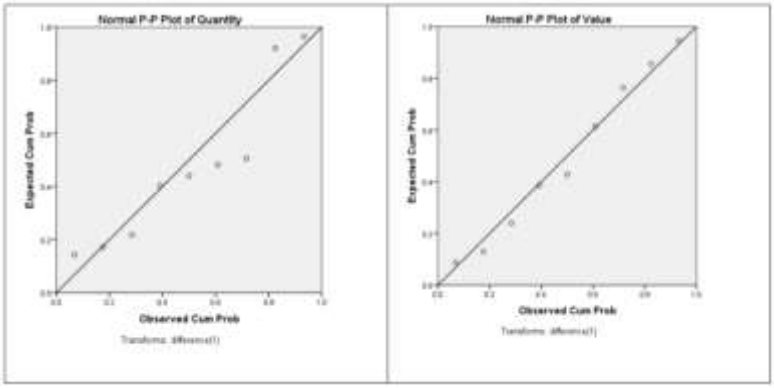

Fig – 3

In Figure 2 and Figure 3 were represented the residuals by comparing them with the normal distribution law. A residual is an observable estimate of the unobservable statistical error. The residuals generally comply with the normal distribution law (an empirical analysis based on the comparison of the curve – Figure 2 and of the points near the line – Figure 3), thus the linear regression model can be applied for the data analysed. As an observation, for the 0.6-0.9 interval the residuals don't comply with the normal distribution law, so on this interval the errors can be higher.

Table – 8: Diagnosis Of Collinearly

Model	Dimension	Eigen value	Condition Index	Variance Proportions		
				(Constant)	Quantity	Value
1	1	2.808	1.000	.02	.01	.01
	2	.155	4.250	.93	.11	.04
	3	.036	8.807	.05	.89	.95

a. Dependent Variable: Time

The most important information transmitted by this table is represented by the values of the condition indexes. Theoretically, an index higher than 15 shows that there is a collinearity problem, while a value higher than 30 indicates serious collinearity problems. In the study come across values of the condition index, above 15, for models represents the linear combination of independent variables which explain best the evolution of economic efficiency.

CONCLUSION

Export of copra in India performance is improved significantly during the study period. It is observed that the quantity and value of the export of the copra is positive growth. The copra is related substitute commodity is the oil palm

and the corresponding palm oil product. The copra is significant factor that determines the quantity as well as value of copra. The global market price depends on the demand of coconut products and it is derived from large scale exporters of the commodity in India.

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