Title of the paper:

FACTORS INFLUENCING CASHEW EXPORTS IN INDIA: A REGRESSION APPROACH

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Abstract

The present study intends to analyse the impact of certain set of chosen variables on cashew exports from India. The dependent variable is the estimated value of export of cashew kernels and the independent variables are area under cultivation of cashew, domestic production and import of raw cashew nuts. The study is based on the secondary data sourced on chosen variables. The study period covered 10 years from 2012 -13 to 2021-22. The major statistical tools used in the study are the ANOVA and multiple regression analysis to analyse the impact of each independence variable on the dependent variable and to find out the statistically significant independent variable. Export growth with respect to area, domestic production and imports, there is a very strong combined significant association between X1, X2, X3 and Y. The study found that there is a very strong correlation between the predicted data (y^) and observed data (y) and the predictor (X_1) explains the variation in Y. The variables X_2 and X3 are found to be not significantly predict Y value and excluded from the final model based on F-statistic and its p- value.

Keywords: Cashew, Exports, Imports, Area, Imports, Impact

1. Introduction:

In developing economies such as India, exports form the backbone of the economy. Among these exports, plantation crops are important. Among such crops, cashews are important. India is a major producer, exporter of cashews and a major contributor to the export-import balance of the global cashew market. Globally, India ranks as the second largest exporter of cashews and importer of raw cashews. Cashew has been cultivated on 1183.912 000 ha of land and producing 751.848 MT of raw Cashew annually. India has been the largest cashew exporter with 15% of the global export share. The total export value stood at US dollar 452 million in 2021 -22 with the growth rate of 7%. Cashew export volumes to that 76.8 million kg with 9% growth rate. Import of raw cashew nuts also playing a key role in promoting Indian cashew processing units and accounted for 50% of domestic as well as global exported demand for Cashew kernels in the country.

The present study considered area under cultivation of cashew, domestic production of raw cashew nuts, the export of cashew kernels and import of raw cashew nuts as variables. To

analyse the impact, export of cashew kernels is taken as dependent variable and area, domestic production and imports as independent variables. The association among the variables is interpreted with the help of ANOVA and multiple linear regression model to find out the statistically significant independent variable based on F-statistic and its p- value.

2. Literature Review

1. Debdutt Behura and Dibakar Naik (1997) conducted a research to study the area under cashew cultivation, domestic production and productivity of Indian cashew to analyse export potential and to examine the impact of global price and Indian cashew. The study period covered from 1965 -66 to 1995 -96. Data collected for different states and for the entire country and calculated using CAGR with long linear function. The study you found that domestic production and import of raw cashew nuts as well as global price rise have positive impact on export of kernel from India and domestic consumption has negative impact.

2. Mahantesh Nayak and Manjunatha Paled (2018) have attempted a study to analyse the trends in area, production, yield, export and import of cashew in India. The study was based on secondary data and employed tools for analysis like arithmetic mean co-efficient of variation and CAGR. The study found that the growth in area, production and yield found to be statistically significant. But the rate of growth of exports declined and that of imports increased significantly.

3. Devendra Prasad Sah (2020) had a research to study the impact of globalisation on Indian cashew export. The study is review based and supported by secondary data collected from different published and online sources. The study found that India experienced negative growth in domestic raw nut production and increasing trend in raw cashew nut imports have adversely affected foreign exchange earnings. It also adversely affected conventional trade partners of India and Indian global competitiveness.

4. Konchada Sandeep Kumar and Koppal Venugopal (2020) studied factors influencing exporting cashew kernel like labour, time finance, production, the government policy and management knowledge. The study area selected for the research was Srikakulam district of Andhra Pradesh and data analysis based on ANOVA and multiple regression analysis. The study found that labour, time, production, government policy and management knowledge have positive significant impact on cashew expose from India.

5. G. Prabhakaran and G Nedumaran (2022) conducted research to analyse the trends in area, production and productivity of cashew and also export and import trends in cashew in India. The study is based on secondary data. The statistical tools for analysis employed like arithmetic mean coefficient of variation and CAGR. The study formed that the highest production of cashew in India is in the state of Maharashtra. The highest cashew import recorded in the year 2021- 22 and that of export in the year 2020-21.

3. Objectives

To examine the impact of variables like area under cultivation of cashew, domestic production of cashew and import of raw cashew nuts from foreign countries on Indian export of cashew kernels are the main objective of the study. Based on the review of existing literature on the study, the variable are selected and hypothesis are formed;

H0: There is no significant impact of set of variables like area, domestic production and import of cashews on export of cashew kernels from India.

H1: Area under cultivation of cashew has a significant impact on cashew exports.

H2: Domestic production of cashew has a significate impact on cash exports.

H3: Import of raw cashew from foreign countries has a significant impact on cashew exports.

4. Methodology

The present study is descriptive and exploratory in nature. It is entirely based on the secondary data sourced from The Department Cashew and Cocoa Development (DCCD) and The Centre Export Promotion Council of India (CEPCI). The study period covered 10 years from 2012 - 13 to 2021-22. Data on variables like area under cultivation of cashew, domestic production of cashew and import of raw cashew nuts from foreign countries and Indian export of cashew kernels are collected to identify the association. The major statistical tools used in the study are the ANOVA and multiple regression analysis to achieve the objectives of the study and to analyse the impact of each independence variable on the dependent variable.

5. Analysis and Interpretation

The ANOVA and multiple regression analysis model used to determine the statistical relationship between dependent variable and the predictors. The dependent variable is the estimated export of cashew kernels and the predictors are area under cultivation of cashew, domestic production and import of raw cashew nuts.

Table 1: Trends in Area, Domestic Production and Import on Cashew Exports from 2012-13 to 2021-22

Year	Export	Area	Production	Import
2012-13	1,04,015	995.61	728.474	8,92,160
2013-14	1,14,791	1003.195	736.860	7,71,356
2014-15	1,18,952	1027.200	725.420	9,39,912
2015-16	96,346	1034.99	670.30	9,58,339
2016-17	82,302	1040.89	779.34	7,70,446
2017-18	84,353	1062.042	817.000	6,49,050
2018-19	66,693	1100.743	742.714	8,35,463
2019-20	67,647	1125.058	702.866	9,38,038
2020-21	48,576	1158.532	738.009	8,31,231
2021-22	51,908	1183.912	751.848	9,39,200

Source: Directorate Of Cashew nut and Cocoa Development, Ministry Of Agriculture And Farmers Welfare, Government of India

5.1 Units:

Dependent variable, Y: Export of cashew kernels (Quantity) in million tonnes

Predictors, X1: Area under cultivation of cashew in million hectares

X2: Domestic production of cashew (Quantity) in million tonnes

X3: Import of raw cashew nuts (Quantity) in million tonnes

5.2 ANOVA

Table 2: Estimation of Impact of Area, Domestic Production and Import on Cashew Exports

Model	Sum of Squares	DF	Mean Square	F-Statistics	P-Value
Regression	3628182543	1	3628182543	**14.9052196**	**0.004803968629**
Residual	1947335305	8	24416913.1		
Total	5575517848	9	619501983.1		

a. Dependent variable: Export of cashew kernels

b. Predictors: Area, Domestic production and import of raw cashews

Table 2 shows that F statistic is 14.905 indicates that more variance is explained by the model. P-value is 0.0048 since p-value < α (0.05), we reject the null hypothesis and indicates the overall regression model is statistically significant.

Table 3: Coefficient Iteration with X_1, X_2 & X_3

Model	Coefficient	SE	t-stat	Standard Coefficient	P	VIF	R^2_{adj}
b	71117.8	6628.75	10.72	0	**0.000038**	-	0.504
X_1	46.5672	18.2524	2.5512	0.03085	**0.04341**	2.3147	
X_2	-4.128939	3.3269	-0.1241	-0.06111	0.90528	1.758485	
X_3	-1.509337	2.73773	-0.5513	-0.24194	0.601333	1.745618	

a. Dependent variable: Export of cashew kernels

b. Predictors: Area (X_1), Domestic production (X_2) and import of raw cashews (X_3)

Table 3 shows that b is statistically significant with p-value equals 0.000038 since p-value < α (0.05). The model shows that X_1 is a statistically significant predictor when p-value is 0.04341 since p-value < α (0.05) and explains for every one unit increase in X_1, the dependent variable is estimated to increase by 46.567 units. X_2 and X_3 are not statistically significant predictors with a very small negative coefficients and very high p-values (0.9052 & 0.6013) since p-value > α (0.05). Adjusted R^2 is 0.504 indicated that 504% of variability in the dependent variable is explained by the independent variable in this model, adjusted for the number of predictors.

Table 4: Coefficient Iteration with X_1 & X_3

Model	Coefficient	SE	t-stat	Standard Coefficient	P	VIF	R^2_{adj}
b	71117.8	6144.7812	11.57285418	0	**0.000008106**	-	0.573
X_1	45.0918772	12.839052	3.51208766	0.0298774	**0.00983172**	1.33279	
X_3	-1.3441052	2.2175898	-0.60611838	-0.2154616	**0.56357116**	1.33279	

Table 4 is a refined model after removing a non-significant variable X_2, b is still highly significant with p-value 0.000081 and X_1 remains a significant predictor with p-value 0.0098 (from 0.0434 to 0.0098 after removing X_2) since p-value < α (0.05). X_3 is not a significant predictor with a very high p-value 0.5635. Adjusted R^2 is 0.573 (increased from 0.504) indicating that the model improved after removing the non-significant variable X_2.

Table 5: Coefficient Iteration with X_1

Model	Coefficient	SE	t-stat	Standard Coefficient	P	VIF	R^2_{adj}
b	71090.18226	5896.710052	12.05590603	0	**0.0000020**		0.607
X_1	41.20329722	10.67241689	3.860727858	0.0273009057	**0.0048003**	1	

Table 5 shows a further refined model after removing non-significant predictor X_3. The p-value is 0.000002 shows b is still highly significant. X_1 is a strong and highly significant predictor in this model with p-value 0.00480 which matches the ANOVA table p-value. Adjusted R^2 is 0.607 (increased from 0.573) indicating that the model still improved. This is the final model with only X_1 as the independent variable.

$$Y = 71090.18+41.2023X_1$$

6. Results and Suggestions

1. ANOVA table shows that the regression model is statistically significant focusing on the values of F- statistic= 14.905 and its p- value= 0.004803.

2. The model has been improved by removing non-significant predictors X2 and X3 by using the backward step method.

3. X_1 is consistently found to be the significant predictor of the dependent variable with p-value has been progressively reduced as non-significant predictors are removed from the model.

4. The adjusted R^2 value increased from 0.504 to 0.573 suggests that removing non-significant variables results in better fitting regression model.

5. VIF value indicates that multicollinearity is not an issue the model.

6. The final model indicates that X_1 is robust and statistically significant predictor of the independent variable, while X_2 and X_3 do not show the significant linear relationship with the dependent variable.

7. The present study suggested for further analytical steps for the regression model such as checking the underlying assumptions of linear regression exploring potential interaction effects.

8. The relationship is very strong among variables which tells that area is significant variable and domestic production and import of raw cashews are non -significant variables and these two have to be strengthened and so far.

9. Area under cultivation is to be considered as one of the most important factors which will influence the domestic production exports and imports. Cashew cultivation to be extended to new and non- traditional areas of the country.

10. Domestic production is not significant variable in the model but has to be supported by efforts like government policy actions, utilization of installed capacity and intensive research and development initiative.

11. Import of raw cashews from foreign countries is also not significant variable in the model that has tried to be reduced and substituted by the domestic production. Imports should be entertained during off- seasons and severe crop failures, unless it has to be reduced in order to save foreign exchange.

7. Conclusion

India has been the prominent producer and exporter of cashew in the world and playing a major role in the global cashew market. India ranked second in cashew exports as well as import of raw cashew in the world. The present study focused on the factors like area, domestic production and import of raw cashew affecting cashew exports from India. But, there are infinite opportunities for India to strengthen export base by concentrating on global market trends, consumer behavior, competitive strategies, export procedures and quality standards. Efforts have to be made to harness export potential of India through diversification of export destination, innovative branding and value addition and focusing on sustainability.

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