Productivity and growth in fish processing sector: The Kerala scenario

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PRODUCTIVITY AND GROWTH IN FISH PROCESSING SECTOR: THE KERALA SCENARIO

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ABSTRACT

Kerala economy is mainly supported by remittances from abroad and traditional industries. Among the traditional industries fisheries sector play a multifaceted role as an income provider both from domestic and export market, nutritious supporter to densely populated state, provider of high employment and as protectors of marine environment. Because of its importance, it becomes one's social responsibility to support the growth of industry by providing timely instructions and adopting prompt policy changes applicable to the related industrial community. This paper aims to highlight the present scenario of the fish processing industry of Kerala with respect to capacity utilization and growth trends. Both primary and secondary data were used to frame this paper. Multiple regression, Chow break point test etc. are applied on time series data to arrive at a conclusion.

Keywords: Capacity Utilization, Productivity, Marine Processed Goods, Kerala.

1. INTRODUCTION

Kerala has a sea shore of 580 km covering 9 districts and fishery sector is considered as a second largest sector in Kerala economy in terms of its contribution to the state Gross Domestic Product. It is considered as a traditional sector which is closely related to the socio- cultural development of the state. Productivity is defined as a ratio of output volume to volume of inputs. This ratio measures the efficiency at which inputs are used to produce a given level of output. Therefore, depending on the type of competing entity, productivity can be distinguished with respect to products, industries or nations as a whole. And depending on the space where entities operate, productivity can be compared on a regional, national or international basis.

Economies of scale are attained through full utilization of plant capacity. Most of the studies related to industrial performance in Kerala reveal that complete utilization of plant capacity is not possible, due to scarcity in recourses, labor problems, lack of proper inventory management etc. An empirical analysis of productivity and efficiency in meat processing units point outs that there are plenty of possibilities in enhancing the performance of these units, Total Factor Productivity and Technical Efficiency shows sector's potential to improve its capacity utilization through proper

policy implications (Ali, 2007). Econometric analysis and DEA model studies were conducted in many of the existing literature related to productivity studies, according to (Fotini Voulgarisa. C., 2013). Production is a function of labor and capital. A number of other variables such as raw material, area and energy are directly related to the production process. Productivity is associated with competitiveness, especially in fisheries where costs are essential in determining prices and the world competition is based mainly on that. Quality of fish is also very important, but given the quality of the Greek fish, the emphasis should be placed on efficient allocation of firm's resources and productivity. In a report developed by George Morris Centre, (2012) the first factor identified is indivisibilities in fixed costs. If some inputs are fixed in size, then unit costs can be decreased until the capacity of these fixed inputs are fully utilized. Secondly, there are economies related to size arising from inventory. Firms operating at a larger size can maintain lower ratios of inventory to sales than smaller ones, based on observations from operations theory. Finally, the costs of firm capacity itself induce economies relating to size- the incremental cost of increasing capacity is decreasing. High investment in fixed assets is associated with negative productivity due to diseconomies of scale in the case of small size firms. High use of working capital decreases productivity, acting as an indication of low managerial capability in the use of firm's funds (Fotini Voulgarisa C. L., 2013).

2. EXPERMENTAL

This paper is supported by primary and secondary data for arriving at the conclusions. Primary data was collected from 157 fish processing units (FPUs) in Kerala while the major sources of secondary information were data available from ASI (Annual Survey of Industry) and CMFRI (Centre of Marine Fish Research Institute). Data on number of factories and value of output taken from ASI database while export quantity and quantity of fish landings was gathered from CMFRI. The period of analysis spans over 1973 to 2013. Percentage analysis is conducted to find out the capacity utilization of units from primary data collected through questionnaire. from sample selected using proportionate stratified random sampling, where south zone, central zone and north zone of the state of Kerala were considered as strata. Multiple regression analysis is conducted by considering value of export as dependent variable and export quantity, quantity of landings, value of output and number of factories as independent variables.

This paper attempts to answer two research questions, summarized as follows.

1. Which factor pre-dominantly determines the export growth of fish processing industries?

2. To what extent the variations in export value can be explained by variations in number of units and productivity?

3. RESULTS AND DISCUSSION

Capacity utilization of production plants is a measure of efficiency of the units which explains how effectively they can utilize the investment to achieve the targeted growth. The analysis of primary data collected through the questionnaire survey, revealed that only 12.10 per cent of the total sample had a capacity utilization of less than 25 per cent. Out of the 157 sample units, 60 (38.22 per cent) and 68 (43.31 per cent) units were utilizing their capacity up to 25 per cent-50 per cent and 50 per cent-75 per cent respectively. Units with 75 to 100 per cent capacity utilization was very less in number i.e., 10 units, constituting only 6.37 per cent of the sample. Fully automated units in micro category show a better state of capacity utilization. However, the small-scale units, which is in large number out of the sample (68% of the sample), failed to utilize the economies of scale. Hence, the survey found that there exist Post harvest losses in fisheries sector. In order to reduce post-harvest losses and in order to improve fish product quality, traditional processing technology must be improved by upgrading traditional fish processing technologies, especially by developing increased control over the production processes. Most of the available production technologies are costly and not affordable by the units in developing countries (F.O.A. George, 2014). The reasons attributable to the inability to exploit the plant capacity in Kerala are the seasonal availability and perishable nature of raw materials. Moreover, they do not have a proper cold storage facility to utilize the increase in raw material availability during chakara (a peculiar marine phenomenon in which many fish and prawns throng together during a particular season as part of mud bank formation). From the primary data analysis, it was observed that the number of factories after the year 1990 shows proliferation of new units. Around 100 units were registered in the state within a period of 1991-2010. Table 1 shows the statistics of number of units and capacity.

Table 1 Number and production capacity of Fish processing Units in India

State	No of Processing Units	Capacity (MT)
Kerala	**288**	**1987.02**
Karnataka	**22**	**286.68**
Goa	**13**	**124.33**
Maharashtra	**47**	**1262.24**
Gujarat	**94**	**1108.84**
Tamil Nadu	**41**	**367.03**
Andhra Pradesh	**55**	**6048.48**
Odisha	**22**	**189.87**
Bengal	**38**	**283.95**
Total	**620**	**11656.44**

The state of Kerala accounting for 46.45 per cent of the total number of units listed in India has only been able to account for 17 per cent of the total installed capacities in all the states taken together. Whether this mere increase in number of factories is a sign of development can only be understood by evaluating the contribution of increase in number of factories to the total export value alongside the quantity exported, quantity of fish landings and value of output.

An ordinary least square regression analysis of with value of export as dependent variable and export quantity, quantity of landings, value of output and number of factories as independent variables was formulated as shown below

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4,$$

Where Y= Value of exports

α = intercept term, β = coefficients of independent variables,

X1 = export quantity,

X2 = quantity of landings,

X3 = value of output and

X4 = number of fish processing units

The results of multiple regression analysis conducted are shown in Table 2.

Table 2 Summary of the regression results of value of exports from 1973 to 2013

Method: Least Squares	Dependent Variable: Value of Export in Rs			
Sample: 1973 2013	Included observations: 41			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Export Quantity	0.005203	0.001187	4.384364	0.000
Quantinty of Landings	7980.943	3680.866	2.168224	0.037
Value of Output	468994.2	82304.56	5.698277	0.000
Number of factories	10247250	12884029	0.795345	0.432
C	-2410000000	1750000000	-1.38026	0.176
R-squared	0.935571	F-statistic		130.689
Adjusted R-squared	0.928412	Prob(F-statistic)		0.000
S.E. of regression	2.11000	Durbin-Watson stat		1.429

On the basis of statistical proof, the null hypothesis that the coefficient is zero, is rejected, at 5 per cent significance level, in the cases of export quantity, quantity of landings and value of output. However, in the case of number of factories the null

hypothesis could not be rejected since probability of t-statistic exceeded 0.05. Similarly, the intercept of the regression equation was also found to be non-significant.

The findings of the research suggest that the export quantity, quantity of landings and value of output are the positive determinants of the value of export. Number of factories was not a significant variable that could explain the variations in export value over the period under study. The overall validity of the model is statistically significant with a lesser than 0.05 probability of F statistic rejecting the null hypothesis that the fit of the intercept only model is as good as the specified model. A very high R squared explaining 93.55% of the variations in value of export in rupee terms could be considered as a reliable model since it is not having a high positive serial correlation of the first order as is indicated by the Durbin-Watson statistic of 1.43 which is not much lesser than the ideal value of 2.

The issue of multicollinearity was further tested for diagnosis of coefficients using Variance Inflation Factors, the results of which are summarized in Table 3.

Table 3 Variance Inflation Factors

Sample: 1973 - 2013		Included observations: 41	
Variable	Coefficient Variance	Uncentered VIF	Centered VIF
Export Quantity	0	3.815413	2.101655
Quantity of Landings	135.49	34.76009	2.240886
Value of Output	677	9.829054	2.45751
Number of factories	166	14.15644	2.058362
C	305	28.16445	NA

With all the values of centered VIF lesser than 10, the no concerns of multicollinearity arose. Yet another condition for avoiding a spurious regression was also tested in terms of normality of distribution of residuals. The residuals diagnostics in terms of histogram normality test is shown in Figure a

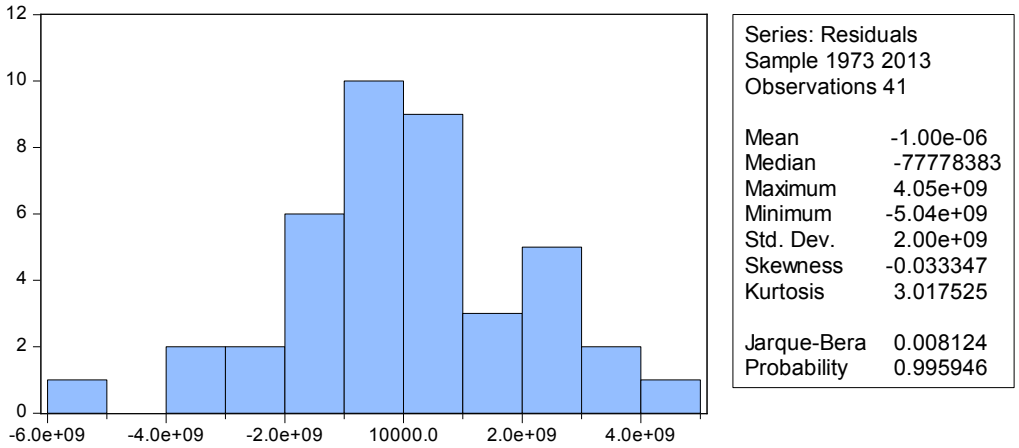

Figure a Histogram – Normality Test

As is evident from the greater than 0.05 probability of Jarque-Bera statistics, the null hypothesis that the distribution is normal could not be rejected. The normality of distribution of residuals thus further validates the model.

The stability of the model was diagnosed using Ramsey's Reset test and the results are depicted in Table 4

Table 4 Ramsey's RESET Test Results

Equation: OLS Entire Period Specification: Value of Exports in Rs., Export Quantity, Quantity of Landings, Value of Output, Number of factories, C			
	Value	df	Probability
t-statistic	1.902227	35	0.0654
F-statistic	3.618467	(1, 35)	0.0654

A greater than 0.05 probabilities of t statistics and F statistics fails to reject the null hypothesis, that the functional form is correctly specified, at 5% significance level. It is thus inferred that the functional form specified for the model is correct.

From the analysis it is clear that there is a high increase in number of units after 1990 and that growth trend existed up to 2010. After 2010, growth in number of units shows high decline. So, the year 1990 is highly significant, and interestingly it is the year in which Government of India adopted New Economic Policy which propagates liberalized trade environment. As per the policy, Government of India liberalized the Industrial Policy and implemented the delicensing system. Delicensing is the measure to wipe off the unnecessary restrictions over the registration process. So, it is relevant to know whether there is any specific break in that period in the value of export. For this purpose, the year in which New Economic Policy for Indian economy was

initiated i.e. 1991 was taken as year for breakpoint test. The result of Chow Breakpoint Test is shown in Table 4.

Table 4 Chow Breakpoint Test: 1991

Null Hypothesis: No breaks at specified breakpoint i.e.1991			
Varying regressors: All equation variables		Equation Sample: 1973 2013	
F-statistic	0.902591	Prob. F (5, 31)	0.0419

A lesser than 0.05 probability of F statistic rejects the null hypothesis that there is no break breakpoint specified, i.e. 1991, at 5% significance level. Hence the assumption that measures of liberalized trade have influence on value of exports in Rupee terms is highlighted.

4. CONCLUSION

Fish processing industries in Kerala is now in a trend of low productivity. There is an inverse relationship between number of units and export value in rupees. As we know, fish products are highly perishable in nature and the high-quality restrictions insisted by the export countries put restrictions over the low technologically improvised units in export trade. High reliability only on domestic market during the Chakara season, forced them to sale out all the products in a low price as they have no cold storage facility to hold it up to a favorable market opportunity. Lack of managerial efficiency is also an important factor in this context, only a few numbers of units have marketing managers. Cluster type location is another reason for low productivity, raw material scarcity and high demand for skilled labor characterized. Mergers and acquisitions of units are suggested measures to increase the raw material procurement capacity, efficiency in labor productivity, collaboration of technological advancement, efficient utilization of capital and improvising managerial skill.

REFERENCES

1. Ali, J. (2007). Productivity and Efficiency in Indian Meet Processing Industry:A DEA Approach. Indian Journal Of Agricultural Economics, Vol. 62, No. 4,.
2. F.O.A. George, A. O. (2014). Fish Processing Technologies in Nigeria: A Case. American Journal of Food Technology, 302-310.
3. Fotini Voulgarisa, C. (2013). Productivity and Efficiency in the Agri-food Production Industry: ScienceDirect, 505-507.
4. George Morris Centre. (2012). Improving Productivity in Canada's Food Processing Sector through Greater Scale. Institute of Competitiveness & prosperity.