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The present impediments in the seafood processing industry in Kerala

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Abstract

Fisheries is one of the new prominent areas of attention in the food processing sector and one of the chief sources of revenue for the state government. Both the government and the industry are keen to tap huge, under exploited potential, with considerable stress on exports. Even though the government is supporting the industry through various promotional measures, the seafood processing industries still face challenges which needs due attention. The problems faced by the industry in Kerala range from procurement of raw materials to export of finished products. The present study aims to evaluate these problems. 34 seafood processing units located in Ernakulam and Alleppey districts in Kerala were purposively drawn in a cross-sectional descriptive survey for the study. Data was collected by utilizing a structured questionnaire. The regression coefficients result of Confirmatory Factor Analysis (CFA) revealed that the major problems faced by the seafood processing industry were marketing, followed by problems with respect to export, production, procurement of raw materials, and finally finance. The results of Independent Sample t-test revealed that a significant difference existed between districts for export problems. The results of One-way ANOVA revealed that a significant difference existed between location of the seafood processing units and problems with respect to procurement, finance, marketing, and export. The results of Pearson's Correlation revealed that a significant relationship was found between overall problems and each problem faced by the seafood processing industry in Kerala.

Keywords: *Fisheries sector, seafood processing industry, marketing, export*

Introduction

The fish processing sector has a vast prominence in the economy because of its export prospective and employment generation capabilities. These industries have been conferred with high prominence with many incentives and exemptions (Muthusamy, 2013). The fish processing facilities have conventionally been dedicated almost entirely on export markets (Spencer *et al.*, 2004). When the majority of the fish products is focused towards the domestic markets, most of the activities related to storing, processing, transporting, grading, and quality control facilities are directed towards the export markets (Salim and

Narayanakumar, 2012). However, the seafood processing industry is facing some challenges presently. Underutilization of plant capacity due to unavailability of raw materials is the most important challenge. The product mix of the country's marine exports keeps on changing owing to changes in production of fish products and thereby fluctuations in the availability of raw materials also prevail (Gopal, *et al.*, 2009a). Seasonality and decline in marine catches, together with topographical differences of landings are the main reason for varying supply of raw materials which led to lower utilization of plant capacity. The bigger firms with backward integration or own fishing boats may function to some level, whereas, the functioning of smaller firms remains inadequate and only nominal quantities are processed during the months of July-August and April-June (Salim and Narayanakumar, 2012). There are several studies that reveal different reasons for underutilization of processing plants (Cherunilam, 1993; Saradamoni, 1995; Unnithan *et al.*, 1998; Panini, 1999; SIFFS, 2002; Mruthyunjaya, 2004; Kulkarni, 2005; Karmakar and Banerjee, 2009; Geethalakshmi *et al.*, 2011; Balasubramaniam *et al.*, 2012; Gupta *et al.*, 2014 and Somasekharan *et al.*, 2014). Huge investment for upgradation of plants, financial restraints, insufficient and unstable power supply, high production cost, unsteady export markets, non-judicious accrediting of new processing units and lack of clean water were the other major reasons for the underutilization of plants.

Compliance with strict quality standards issued by the importing countries is a major challenge. It was indicated that the compliance of European Union (EU) norms and implementation of Hazard Analysis and Critical Control Point (HACCP) require huge investment. However, due to shortage of raw materials and low capacity utilization the gains remain insignificant (Salim and Narayanakumar, 2012). The small firms were the poorest sufferers with additional cost and affecting their competitiveness (Mruthyunjaya, 2004). The increased demand for high stringent quality standards in the production and processing that led to the investment in supply chain upgradation or regulatory systems was not correlated with the growth of marine exports. In Kerala, most of the concentration and consolidation is occurring at the processing node of the supply chain where the number of processors has declined and professional companies are advancing their place in the value chain (Somasekharan *et al.*, 2014).

Competition in the export market is another problem facing the industry. Intense competition in the international market with product diversification for sustaining the market share, Indian seafood industry continuing to be a supplier of raw materials to pre-processing units in foreign countries, sudden rise in farmed shrimp production in China, Thailand, Indonesia, and Vietnam, and anti-dumping duties by the US were the major export related problems (Salim and Aswathy, 2011). EU countries with fluctuating quality standards and cases of denial and alerts also affected the industry especially peeling shed industry (Ashok *et al.*, 2003; Henson *et al.*, 2004; Das, 2008; Geethalakshmi *et al.*, 2010), besides the arrival of a small group of powerful competitors (Ashok *et al.*, 2003). The seafood labeling requirement to ensure food traceability was also introduced by US besides anti-dumping duties (Kulkarni, 2005). Import duties and the need to certify the quality assurance measures stances a major barrier to fish processing industries especially to small scale export industries and non-industrialized fish processing sector (Kamat and Kamat, 2007).

The EU process requirements enforce more than required conditions often which is not enumerated in formal documents. Apart from process regulations, there are also product regulations imposed by both the EU and the U.S., with regards to imposition of standards on specific ingredients present in ultimate product and on environmental aspects (Kulkarni, 2005).

The frequent inspection by Marine Product Export Development Authority (MPEDA) for ensuring stringent hygienic control in the plants following registration is the major reason for reluctance on the part of owners to apply for registration (Sathyan *et al.*, 2014). The industry is capital intensive in nature which acts as a strong entry barrier and permits only a limited number of companies to enter the market which decreases efforts to improve quality standards (Surendra *et al.*, 2012). Jayakumar and Kumar (2010), pointed out that any alteration in food safety standards would directly affect the export firms, which are considered as vulnerable to face stricter scrutiny and probable rejection of their consignments besides limits on cadmium metals and other environmental contaminants. High fixed costs and inadequate annual peak production period linked with the accessibility of high value species such as shrimp and cephalopods are the other constraints (Jayakumar and Kumar, 2010). Because of this, the industry shifts to those products where contracts and operational costs can be reserved to the minimum. (FAO, 2003). Another constraint is that the importing country requirements keep on changing, which gives the exporters little time for its compliance (EPW, 2002).

Issues with respect to marketing is another major problem facing the industry. The prices at which the seafood products are sold in the chief international markets like the US and Japan are decided by the importers and their agents in India (EPW, 1982). Geethalakshmi *et al.* (2010) stated that when comparing the unit value realized through exports of Indian shrimps to Japan, India realized lesser unit value than other competing countries.

The infrastructure constraints were also documented as one of the major problem facing the industry (Tietze, 1998). As

per SEAI (n.d.) the fisheries sector is governmentally spread over several ministries and departments in which aquaculture comes under agriculture ministry, seafood processing under food processing ministry, marine exports come under commerce ministry, and fishing harbours under state government. Also, the existing Fisheries Act 1897 is more than 100 years old. All these problems have a direct bearing on the export oriented seafood processing industries. Most of the studies undertaken earlier was confined only to issues with respect to exports, marketing, and capacity utilization alone (Prochaska, 1984; Unnithan, *et al*., 1998; Jaiswal, 2003; Kulkarni, 2005; Karmakar and Banerjee, 2009; Gopal *et al*., 2009a; Geethalakshmi *et al*., 2010, 2011; Salim and Aswathy, 2011; Jeyanthi and Gopal, 2012; Balasubramaniam *et al*., 2012; Hassan *et al*., 2012; Pathare, 2013 and Gupta *et al*., 2014).

Despite the advancements in the sector the export oriented seafood processing industry in Kerala is facing problems. Even though the industry is a major source of revenue for the state government, its contribution to this sector is meagre. From the review of literature, it is clear that, there is a research gap in evaluating the problems faced by the industry in Kerala with respect to procurement of raw materials, production, finance, marketing, and exports separately. Thus, the present study aims to evaluate the major problems faced by the industry in Kerala. The study also focusses on the problems faced by the industry on the basis of the demographic profile of the processing units. Also, the study evaluates the relationship between overall problems and each problem faced by the industry and the following research hypotheses is framed:

H_1: There is a significant difference between demographic profile and problems faced by the seafood processing industry in Kerala.

H_2: There is a significant positive correlation between overall problems and each problem faced by the seafood processing industry in Kerala.

Material and methods

The present study follows cross-sectional descriptive research design and a structured questionnaire was utilized for the collection of primary data. The researcher has adopted purposive sampling design. As the majority of the seafood processing plants are located in Alleppey and Ernakulam districts in Kerala, a sample of 34 export oriented seafood processing units located in these two districts were selected for the study. The structured questionnaire consists of two parts: the first part includes the demographic profile of the seafood processing units. The second part consists of constructs and its items on problems faced by the seafood processing industry in Kerala which is depicted in Table 1. The response for each item was reverse coded using a 5 point Likert scale ranging from very high (1) to very low (5). Frequency Table, CFA, One-way ANOVA, Independent Sample t-test, and Pearson's correlation were the data analysis tools used for the study. The data was analyzed via SPSS and AMOS 20.0 for Windows and the data analysis was conducted in two stages. First stage comprised of descriptive statistics and confirmation of reliability and validity of measuring items including confirmation of model fit using CFA. Finally, parametric tests such as One-way ANOVA and Independent Sample t-test were used to assess the problems faced by the seafood processing industry on the basis of the demographic profile of the processing units. The demographic profile of the seafood processing units includes: district, location, year of establishment, plant capacity, form of organization, capital investment, type of processing covered, and plant category. Pearson's Correlation was used to assess the relationship between overall problems and each problem faced by the industry.

Table 1. Classification of problems faced by seafood processing industry

P1	Procurement of raw materials
P2	Production
P3	Raising the capital /finance
P4	Marketing
P5	Export

Classification of problems faced by seafood processing industry

Procurement: Procurement problems include problems with respect to acquiring of raw materials like unavailability of raw material at reasonable prices, at required time or on credit basis; price fluctuations, unfair trade practices, intervention of intermediaries or long distribution channels; poor quality, shortage in quantity or unavailability of uniform quality raw materials; transportation costs, and low ceilings by government grants, and subsidies.

Production : Production problems refer to problems with respect to cost of production, product quality maintenance, production capacity, obsolete technologies, electricity shortage, potable water supply system, proper road and transport infrastructure; scarcity of local labourers and labour turnover; import duties, and trade union problems.

Finance : Finance problems consist of difficulty in getting adequate credit, subsidy from government, and loan when needed. Other problems with respect to finance include high rate of interest, strict rules and regulations, lengthy processing time for availing loan, insufficient repayment period, difficulty in getting funds from financial institutions, and constraints on fund procurement and settlement.

Marketing : Marketing problems include shortage of accredited labs, low customer demand, intervention of mediators, inflow of cheap imported goods, increase in competition, decrease in new customers, customer's preference for fresh seafood; advertisement, packaging, and logistics cost; lack of marketing information, lack of storage facility and wagons with cold storage facilities, Weights and Measures Act and Packaging Commodity rules, unpredictable and overlapping food laws, central and state policies and taxation.

Export : Export problems includes increased reefer base rates and terminal handling charges; anti-dumping duty, withdrawal of subsidies, importers default in making payment; cultural, language, political, and legal systems differences; strict food safety legislations by EU, HACCP requirements by US, unpredictable requirements of importing countries, inadequate time to comply with regulations, currency problems, export duty, competition in international market, government restrictions; complicated export formalities and procedures; procedural delay; and problems with respect to catching export market and quality standard maintenance.

Results and discussion

Table 2 summarizes the demographic profile of the seafood processing units. It was observed that, among the study respondents, 65% of the processing units belong to Ernakulam and 35% to Alleppey District. Among sample respondents, half of the seafood processing units are located in an urban area (50%). Around 56% of the processing plants were established before 1999. The majority has plant capacity below 50 metric tons (79%) and 44% of the units are private limited companies. Half of the processing plants under study belong to large scale enterprises category as half of the units have a capital investment above 5 crores (50%). With respect to the type of processing covered, 40% of the seafood processing units undertake block freezing followed by blast freezing (35%), and IQF (23%). The majority of the processing plants belongs to the European plant category (82%).

The reliability of the construct items was evaluated by using Cronbach's alpha. The result shows that all the constructs have reliability greater than 0.70, which shows the internal consistency of the items (Table 3).

Confirmatory factor analysis

The results of confirmatory factor analysis revealed that the measurement attributes are loaded in accordance with the latter value in the factor analysis. The measurement model

Table 2. Demographic profile of the seafood processing units

Variable		Frequency	Percentage
District	Alleppey	12	35.3
	Ernakulam	22	64.7
Location	Rural	10	29.4
	Semi-urban	7	20.6
	Urban	17	50.0
Year of Establishment	Established before 1999	19	55.9
	Established after 1999	15	44.1
Plant Capacity	Below 50 metric tonnes	27	79.4
	50 - 100 metric tonnes	4	11.8
	100 metric tonnes & above	3	8.8
Form of organization	Sole Trading	3	8.8
	Partnership	14	41.2
	Private Ltd. Co.	15	44.1
	Public Ltd. Co.	1	2.9
	Cooperative Concern	1	2.9
Capital Investment	Below 25 lakhs	2	5.9
	25 lakhs - 5 crore	15	44.1
	Above 5 crore	17	50.0
Type of Processing Covered	IQF (Individual Quick Freezing)	17	22.7
	Block Freezing	30	40.0
	Blast Freezing	26	34.7
	Canning	1	1.3
	Breaded & Battered Products	1	1.3
Plant Category	European	31	81.6
	Non-European	7	18.4

Source: Survey data

Table 3. Reliability

Variables	Cronbach's Alpha	Number of Items
Procurement of raw materials	0.829	12
Production	0.836	11
Raising the capital /finance	0.911	9
Marketing	0.898	17
Export	0.952	20

Source: Survey data

indicated an acceptable fit of the data exhibited in Table 4 which indicates that all the attributes are loaded significantly on the latent constructs. The value of the fit indices indicates a reasonable fit of the measurement model with data.

Construct validity is the extent to which a set of measured variables actually reflects the latent construct they are designed to measure and was established in this study by using face validity, convergent validity, and discriminant validity. Face validity was established by adopting the measurement items used for the study from the existing literature and adopting the same to the present research context. Convergent validity was assessed by examining the factor loadings and average variance extracted of the constructs. All the indicators had significant loadings onto the respective latent constructs (p=0.001) with values varying between 0.6 to 0.9. In addition, the Average Variance Extracted (AVE) for each dimension is greater than or equal to 0.55, which further supports the convergent validity. Discriminant validity was assessed by comparing the Average Variance Extracted (AVE) with the corresponding inter-construct squared correlation estimates. The AVE values of all the dimensions are greater than the inter-construct correlations, which supports the discriminant validity of the constructs. Thus, the measurement model reflects good construct validity and desirable psychometric properties (Table 5).

The standardized regression coefficient results of CFA revealed that the highest problem facing the industry is related to marketing (0.991), followed by problems regarding export (0.793), production (0.776), procurement of raw materials (0.769), and finance (0.776). The result of the CFA analysis is exhibited in Table 5 and Fig. 1.

Testing the difference in problems on the basis of demographic profile

The influences of control variables such as district, location, year of establishment, plant capacity, form of organization, and capital investment on the problems faced by the seafood processing industry in Kerala were analyzed. The results which show significant difference are presented below.

The results of independent sample t-test regarding export problems show that there exists a significant difference between the district to which the seafood processing units belongs as the p value is less than 0.05 (Table 6). Thus, hypothesis H_1 is accepted in this case. This indicates that problems with respect to export is varying with the differences in district. Further, the analysis of means revealed that the export problems is high among seafood processing plants belonging to Alleppey (64.45) compared to those belonging to Ernakulam (46.73). However, no significant difference exists between the districts to which the seafood processing units belongs for problems with respect to procurement of raw materials, production, finance, and marketing.

The results of One-way ANOVA test depicted in Table 7 reveal that a significant difference exists between the location of seafood processing units for problems with respect to procurement, finance, marketing, and export as the p value in this case is less than 0.05. Thus, hypothesis H_1 is accepted in this case. However, no significant difference exists between location of seafood processing units for problems with respect to production.

Since the ANOVA test indicates that a significant difference exists between different locations for problems with respect

Table 4. Model fit Indices for CFA

	χ^2	DF	P	Normed χ^2	GFI	AGFI	NFI	CFI	RMR	RMSEA
Problems faced by the seafood processing industry	2.408	4	0.661	0.602	0.973	0.899	0.980	1.000	2.207	0.000

Source: Survey data

Table 5. The regression Coefficients – Problems faced by the seafood processing industry

Problems faced by the industry	Regression coefficient	t value	P value	Rank	AVE	Composite Reliability
Procurement Problems	0.769	4.823	<0.001	4		
Production Problems	0.776	4.904	<0.001	3		
Finance Problems	0.689	4.253	<0.001	5	0.656	0.904
Marketing Problems	0.991	6.239	<0.001	1		
Export Problems	0.793	5.038	<0.001	2		

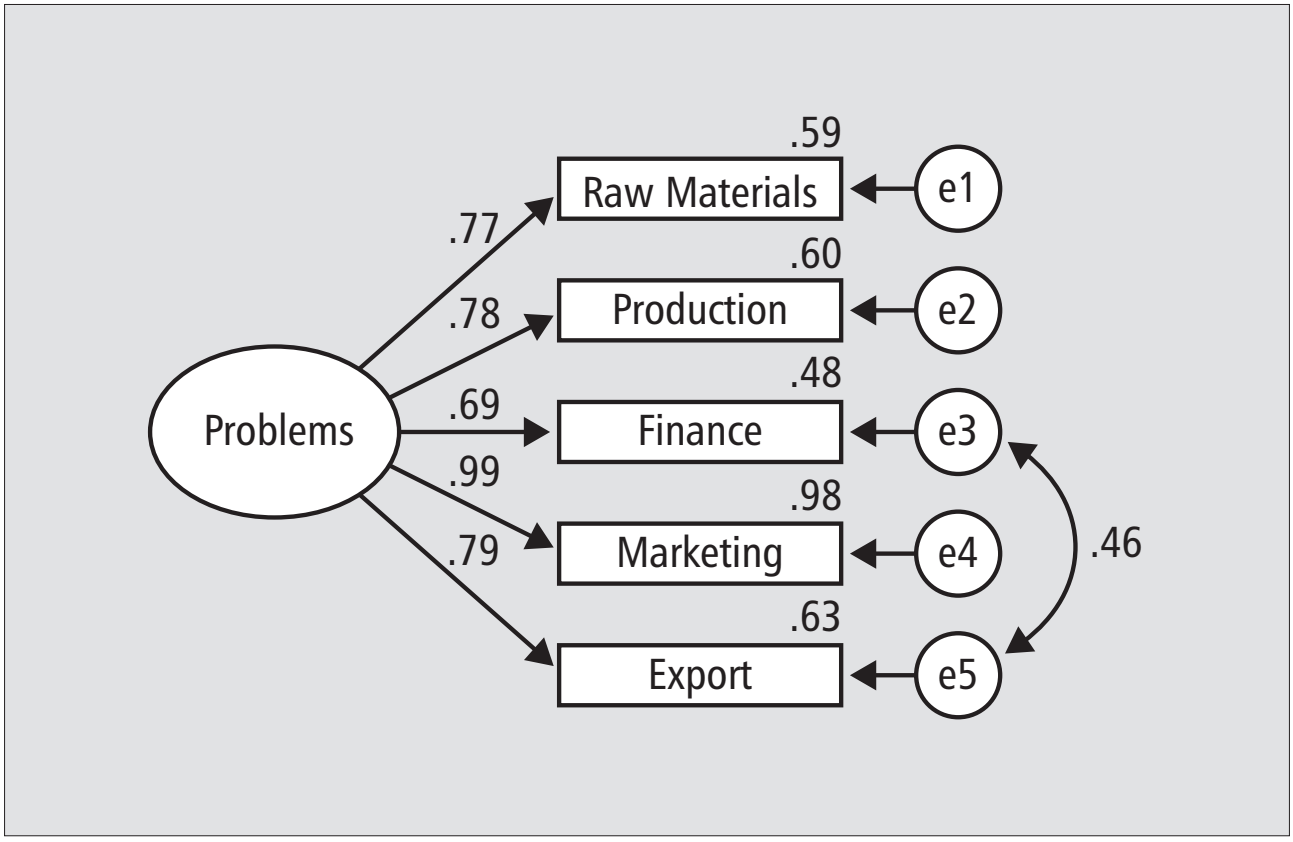

Fig.1. Problems faced by seafood processing industry

Table 6. Means & Independent Sample t-test results for district & problems faced by seafood processing industry

Variables	District	Mean	SD	t-value	P value
Export problems	Alleppey	64.45	14.56	0.056	0.008*
	Ernakulam	46.73	17.85		

Source: Survey data, *Significant at 5% level

Table 7. Means & One-way ANOVA results of location & problems faced by the seafood processing industry

Variables	Location	Mean	SD	F value	P value
Procurement problems	Rural	37.67b	8.43	3.533	0.042*
	Semi-urban	36.14ab	9.99		
	Urban	29.65a	6.91		
Finance problem	Rural	28.00b	7.87	3.988	0.029*
	Semi-urban	25.57ab	7.23		
	Urban	19.59a	7.71		
Marketing problems	Rural	50.00b	12.70	4.979	0.014*
	Semi-urban	47.29b	13.16		
	Urban	36.00a	10.71		
Export problems	Rural	68.00b	13.00	7.542	0.002*
	Semi-urban	55.86ab	13.09		
	Urban	43.18a	17.70		

Source: Survey data, *Significant at 5% level, Note: Different alphabets between location denotes significance at the 5% level using Duncan Multiple Range Test (DMRT)

to procurement, finance, marketing, and export, a post-hoc test namely Duncan Multiple Range Test (DMRT) was conducted to identify which among the locations differs significantly. Based on DMRT, the seafood processing units belonging to rural area (37.67) experience higher problems in procurement of raw materials, than those belonging to urban area (29.65). However, no significant difference exists among other group. With respect to problems in finance, the seafood processing units belonging to rural area (28.00) experience higher problems than those belonging to urban area (19.59). However, no significant difference exists among other groups. With respect to problems in marketing, the seafood processing units belonging to rural areas (50.00) and semi-urban areas (47.29) face higher problems when compared to those belonging to urban areas (36.00). Concerning problems in exports, the seafood processing units belonging to rural areas (68.00) encounter higher problems than those belonging to urban areas (43.18). However, no significant difference exits with other groups (Table 7).

With respect to assessment of problems faced by the seafood processing industry on the basis of other demographic profile of the seafood processing units, no significant difference exists between year of establishment, plant capacity, form of organization, capital investment, type of processing covered, and plant category for perception towards problems faced by the industry.

The results of Pearson's correlation coefficient revealed that there is a significant positive relationship between overall problems and each problem faced by the seafood processing industry as the p-value in these cases are less than 0.01 (Table 8). Thus, hypothesis H_2 is accepted as the nature of the correlation is positive for all the significant cases and the coefficient values are also positive. Thus, it is inferred that there is a significant positive correlation between overall problems and each problem faced by the seafood processing industry in Kerala. That is, the problems with respect to procurement of raw materials, production, finance, marketing, and exports contributes to overall problems faced by the seafood processing industry in Kerala.

The correlation between overall problems and each problem faced by seafood processing industry in Kerala

This study is the first to evaluate the problems faced by the seafood processing industry in Kerala on the basis of procurement, production, finance, marketing, and exports. The results of the present study reveal that the most vital problem facing the industry is related to marketing. This results supports the findings of Karmakar and Banerjee (2009), that the major weakness facing the industry is the failure to develop a sound marketing tactic to sell its products abroad.

Surendra *et al.* (2012) pointed out that inadequate information and marketing linkages was one of the marketing problem faced by the food processing industry including fish processing. As per Prochaska (1984), major uncertainties in marketing in seafood processing industry include inferior market price and quantity related data, delay in between procurement and sales, interruption in market signals concerning product image changes, market levels, and export sales, storage-related activities, new technology, government regulations, and new product and market development activities.

The second major problem facing the industry is related to exports. In a study Gopal *et al.* (2009b), observed that the economic feasibility of the units is affected by the growing capital investment on the compliance of quality standards set by the EU and HACCP set by the US. As reported by Mruthyunjaya (2004), processed fisheries products of India are much cheaper when compared to that of competing countries. Also, processing

Table 8. Correlation between overall problems & each problem faced by the industry

Correlation - Overall problems & each problems	1	2	3	4	5	6
Overall problems	Correlation Coefficient	1				
	Sig. (1-tailed)	-				
Procurement problems	Correlation Coefficient	.789**	1			
	Sig. (1-tailed)	0.000				
Production problems	Correlation Coefficient	.799**	.653**	1		
	Sig. (1-tailed)	0.000	0.000			
Finance problem	Correlation Coefficient	.826**	.486**	.593**	1	
	Sig. (1-tailed)	0.000	0.002	0.000		
Marketing problems	Correlation Coefficient	.940**	.771**	.771**	.704**	1
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	
Export problems	Correlation Coefficient	.913**	.591**	.581**	.768**	.787**
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	0.000

Source: Survey data, **Correlation is significant at the 0.01 level (1-tailed)

companies are facing constraints of complicated exporting formalities, high shipping costs, huge competition, and varying quality standards of importing countries.

The third major problem is procurement and production problems which partly supports the findings of some previous studies. Gupta *et al.* (2014), observed that the major constraint confronted by the seafood processing industry was the deficiency of superior quality raw materials. The increasing idle capacity due to unavailability of high value raw materials, give rise to increased cost of production (Gopal *et al.*, 2009a). Cherunilam (1993); Mruthyunjaya (2004); Geethalakshmi *et al.* (2011); and Balasubramaniam *et al.* (2012), also reported the problem of irregular supply or scarcity of raw materials as the major reason for underutilization of processing plants. Unnithan *et al.* (1998), in a study pointed out that cut throat competition for raw materials and unstable increase in raw material prices, are the major reasons for its unavailability, leading to low capacity utilization. Rao and Prakash (2000), observed that some exporting firms also experience shortage of skilled workers. Compared to above discussed problems, the seafood processing industry in Kerala is facing less issues with respect to finance. However, it is observed that all the five problems contribute to overall problem faced by the industry.

The results of the present study reveal that export problem is observed to be high among seafood processing plants belonging to Alleppey District. The problems with respect to procurement of raw materials, finance, marketing, and export is observed to be high among the seafood processing plants located in rural areas. The reason is mainly because the export related infrastructures such as nodal agency, inspection agencies, shipping port, and other infrastructures are easily accessible to the seafood processing units located in Ernakulam and those in urban areas when compared to those belonging to Alleppey and rural areas. Tietze (1998), reported that the infrastructure constraints lead to obstacles in confirming quality, cost control, and the obligations of supply schedules. Surendra *et al.* (2012), also reported that the absence of adequate infrastructure such as rural road connectivity, lack of power supply and cold chain facilities were the major production problems faced by the food processing industry including fish processing.

The regression coefficient results of CFA revealed that the major problems faced by the seafood processing industry are problems with respect to marketing followed by export, production, and procurement of raw materials and least significance is regarding financial problems. The results of independent sample t-test clearly reveal that a significant difference exists between districts for problems with respect to exports. Also, the results of One-way ANOVA show that there is a significant difference between location for problems faced by the industry with respect to procurement, finance, marketing, and export. The seafood processing units belonging to Alleppey and those located in rural areas reported high problems with respect to procurement, finance, marketing, and export. The results of Pearson's correlation revealed that there exists a significant relationship between overall problems and each problem faced by the seafood processing industry in Kerala. It is inferred that easy accessibility to various infrastructure is the major aspect for minimizing the various problems facing the industry. It can also be suggested that as marine resources are seasonal in nature, more aquaculture farms can be promoted for uninterrupted supply of raw materials during off seasons for these seafood processing units. Introducing value added products and compliance with better quality standards will help to control competition in international markets which in turn adds revenue to the government and more income to the processors. Providing reasonable wages, better welfare measures, and social security benefits to the workers will help in retaining existing local workers and attracting new local manpower into the industry. Proper support from the government in each and every activity from procurement till export of finished goods can solve majority of the problems faced by the industry.

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