# Efficiency Seeking Foreign Flows in Indian Automobile Sector

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## Abstract

*India remains the fastest growing economies and the top market for attracting FDIs in the world. The Country has also seen a sizeable inflow of foreign investments in manufacturing sector. Among the manufacturing sectors, the automobile sector tops the list of the largest attracter of foreign flows. A firm's performance is measured through key financial ratios, market performance, and efficiency. Studies focused on efficiency have benchmarked firms for its operations and cost effective performances. Firms reach level of efficiency, when they are able to produce maximum output with a given amount of input. Indian Government's new policy regime on Foreign Direct Investments has invited 100 per cent FDI in Indian Automotive sector. Capital is a key factor to the production and foreign capital, which aim at maximising investment need and look for efficient firms. In this context, the study focuses to measure efficiency of Indian automobile firms and to relate foreign flows in those companies as a result of efficient operations. The purpose of the study is to classify the firms which are efficient from the inefficient and to test whether the efficient firms attract better foreign capital. The study has been conducted for selective automobile concerns in India for a period of last 10 years.*

Keywords – Automobile sector, Capital Investment, Efficiency, Foreign Direct Investment, Manufacturing sector.

JEL classification: L62, D24, H21, F 21, L6

## Introduction

The Indian Government has always been slow and steady for involving foreign investments in its economy. Acceptance of LPG policy was a game changing decision taken by the government of India to enhance international competitiveness by allowing other countries to enter Indian Markets. Though this policy bought significant shifts in the economy, the government had only allowed foreign investments in few selective sectors. Now along with subsequent reforms process and the initiation of Make in India, nation has witnessed a new trend in foreign inflows into the country. This is a result of liberal policy reforms with lesser restrictions and regulations, that India stands today as the top market for attracting FDI. According to Data released by RBI, the country's FDI for the year 2018 was 37366 million US$ dollars(Appendix Tables Appendix Table 19 : Foreign Direct Investment Flows To India :, 2012).

Earlier to 1982 Automobile industry of India had only 5 players, where buyers had to wait for long to buy outdated models. The era of Automobiles started only when government of India and Suzuki formed Maruti Udyog, many component manufacturers entered India through Joint ventures and the sector became buyers' market. Since then, government of India has planned a set of policy reforms and has bought structural changes to enhance the sector. Today Indian Automobile Industry is the 4th largest in sales and 7th largest manufacturer of commercial vehicles. Indian Automobile sector attracts the largest portion of Foreign inflows among the available sectors.

A firm's performance is measured through key financial ratio's, market value and efficiency. Efficiency of the firm measures the effective utilisation of resources for achieving the desired level of production or returns. Studies performed on efficiency state that it is a model, built on a linear mathematical algorithm, which measures the performance of selected companies. From the previous Literatures, it has been observed that efficiency can be measured in both ways as input oriented and output oriented returns to scale methods. Capital is the key factor necessary for production and foreign investments, contribute towards capital infusion. Firm's looking for FDI investment, prefer to invest in companies with better efficiency.

The existing studies state that, the efficiency of the firm acts as determinant of Foreign Inflows for the firm(Aseidu, 2002). Thus, the aim of the study is to evaluate the efficiency of companies and then test for association between the efficiency of the firm and Flow of Foreign inflows into the firms.

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## Review of Literature

(Nayak, 2005) in his paper, studied the case of Suzuki Motors and the investment of Suzuki motors in India. The author used case study approach to study the automobile industry performance prior to entry of Suzuki Motors in India, and the success of foreign investments in Indian Automobile industry. In light of this objective, the author identifies, holistic model in the way Suzuki motor's strategic investment patterns in complementary business helped the firm to succeed.

(Nag et al., 2007) the authors have studied the merger & restructuring of automobile firms in the emerging economies. The Objective of the study is to examine role of governments of Asian economies on the growth of automobile firms. The paper also focuses on trade patterns and change in ownership structures of automobile sector.

(Saranga, 2009) analysed the performance of auto component industry from original equipment manufacturer and component suppliers point of view. Using DEA analysis on the financial data on a sample of 50 firms, the authors have computed technical, input mix and scale efficiencies. The study finds that majority of inefficient firms are operating at lesser efficiencies. The authors, then identified that substitution of labour and capital is causing inefficiencies. The study reveals that, Indian auto component industry should focus on higher average inventories to achieve higher operational efficiencies.

(Hanousek et al., 2012) the authors conduct a study to investigate the effectiveness of firms in Czech Republic. They study the evolution of efficiency in the country by taking a large sample of 19000 firms. Using Panel data analysis, the researchers study, whether the firms use their resources efficiently and in the second part of the study they try to compare the efficiency of the firms with the ownership structure the firms hold. The results of the study reveal a positive relationship between the foreign ownership and efficiency. Further it also clears out that a firm with majority in the corporate structure has no role to play the level of efficiency the firm achieves.

(S. K. Sharma & Raina, 2013) used data envelopment analysis to study the performance of automobile firms. The study was carried out for a panel data through key efficiency indicators. It was found that automobile firms are technically inefficient during the considered period of study. The author finally suggests that, there is a need to focus on the input targets to achieve better efficiency results.

(Çalmaşur, 2016) in their paper conducted technical efficiency analysis for the Turkish automotive industry for a period of 20 years. Using the stochastic frontier analysis, they observed that there is a positive relationship between the capacity utilisation ratio, firm size, foreign capital ratio and export intensity; and negative relationship with the firm age and technical efficiency. However, the study can also be conducted using different methods for evaluating the technical efficiency of the automotive firms.

(Jiang et al., 2018) using the Malmquist model of Data Envelopment Analysis, the authors measured the efficiency of 77 automobile firms listed as A share in China. The authors have taken operating income as an output variable and fixed assets, operating expenses, intangible assets and number of employees as their input variables for the model. The study results reveal that, the five year indices of these firms has decreased due to technical change and improvement of the efficiency change.

(Sur & Nandy, 2018) In this paper author tries to study the spill over effect of FDI on efficiency of Indian automobile firms. The author has computed technical efficiency of the foreign and domestic firms independently and then compares both results. The results of the study reveals that, the foreign firms have better technical efficiency as compared to domestic firms; also the young firms both domestic and foreign firms are more efficient and due to the inward orientation the domestic firms were unable to achieve benefits from exporting activities.

The list of above literatures, studies have been conducted to measure the efficiency, productivity of automobile firms across various countries. Many authors have conducted research on the motives for attracting Foreign Direct Investments in to their countries. One such motive is efficiency seeking motive of foreign investments in host country. There are very few studies been conducted on measuring the efficiency of the firms and then comparing the same with inflow of foreign capital (Hanousek et al., 2012). Therefore, the present paper focuses on Comparing the efficiency of Indian Automobile firms with the level of foreign investments.

### Technical Efficiency

The technical efficiency is commonly defined as the level of production of firms with regard to the utilisation of input resources in generating the desired level of outputs. When one talks about the efficiency of the firm, it usually means the success of firm in producing large outputs from a given set of inputs, provided all inputs and outputs are measured correctly(Farrell, 1957). Efficiency frontiers can be studied either through parametric approach or non-parametric approach. The non – parametric approach which has been used in the study is developed using mathematical programming called as Data Envelopment Analysis (DEA). DEA uses linear

programming method to estimate the efficiency of firms, which are usually termed as Decision Making Units (DMUs)(Charnes et al., 1978). The DEAP Package is an application tool created for quick computation of efficiency of the firms under simple productivity models, such as Constant returns to Scale(CRS) and Variable returns to Scale(VRS).

This paper is based on measuring the technical efficiency of automobile firms, using a CRS model for 2 input and 1 output model. Where the CRS model measures the efficiency of the firm in producing the same outputs by minimising the inputs required in the production. The model is based on an Input Oriented Approach to estimate the lesser amount of inputs necessary to produce the required level of outputs.

Since Automobile industry is a capital intensive industry for producing automobiles and components the finance invested in the firms plays an important role in production. The cost of labour in the automobile industry is one input expense which influences the production output.(S. Sharma, n.d.). Thus the study considers the Finance cost and employee cost as two major input variables. As Operating profit reflects the revenue generated out of the total production, the component is used as output variable.

## Research Methodology

### Nature of the Study

This study has been conducted based on quantitative data. Secondary data collected from company's annual reports has been considered for analysis. Thus, it is a quantitative study. The study is also an analytical study as it aims to test for association between efficiency of Indian automobile firms and foreign inflows in Indian automobile firms.

### Objectives of the Study

1. To evaluate the technical efficiency of the Automobile companies under study;
2. To test the association between the efficiency and the foreign inflows;
3. To analyse whether the efficiency has relation with foreign investment inflows.

### Research Hypothesis:

$H_1$: There is a significant difference in the efficiency of the firm.

$H_2$: There is a significant difference in the foreign inflows of the firms.

$H_3$: There is a relationship between efficiency of the firm and the foreign investment inflows in the firm.

### Collection of Data

Six automobile companies were selected for the study. The ten years' data for all six companies was collected from the company's annual reports. The information on the inputs and output variables is collected from the secondary sources.

The data related to finance cost, employee cost, operating income was collected to run DEA analysis. The data related to foreign investment inflows were collected to test for association.

### Tools used for Analysis

**Data Envelopment Analysis:** with the data collected from the annual reports, input oriented constant returns to scale model is adopted for testing the technical efficiency of the firm. Here in this model of two input one output Constant returns to scale the following data was considered.

Present study uses the CCR model was introduced by (Charnes et al., 1978). This model measures the efficiency of each DMU which is obtained as a maximum of the ratio of total sum of weighted outputs to total sum of weighted inputs. Consequently, in this paper, we use input oriented CRS model to calculate the technical efficiency for 10 years (2008-09 to 2017-18), which is defined as follows:

Efficiency of the firm = Weighted sum of the outputs / Weighted sum of inputs

In this study,

1. Two inputs, i.e., employee benefit expenses and finance cost;
2. One output is total operating income.

**Single Factor Anova:** This test was used to check difference between the efficiency and difference between the foreign inflows of the firms.

### Hypothesis Development:

The null hypotheses were designed as mentioned below:

H01 There is no significant difference in the efficiency of the company.

H02 There is no significant difference in the foreign inflows of the company

### And the alternative hypotheses are:

H11: There is a significant difference in the efficiency of the company

H12: There is a significant difference in the foreign inflows of the company

**Correlation:** Using EXCEL Tool correlation test for all the companies was conducted to test the relationship between change in efficiency level of firms with change in foreign investment inflows.

## Data Analysis and Interpretations

The data for conducting the technical efficiency test was obtained through company's Annual reports. The collected data was then used for measuring the efficiency using input oriented CRS model under DEAP Program. The year wise, evaluation of technical efficiency for 6 firms is done. The results of the Technical Efficiency Score of all the firms every year is recorded to check the performance of selective automobile firms in achieving the better productivity.

The following table represents the summary of results arrived by above process for the last 10 years.

From the above table it is evident that Bajaj Auto has set the benchmark for efficiency among the six automobile firms. Hero moto corp has been maintaining a considerably better level of efficiency for ten years. TVS motors and Ashoka Leyland have seen consistent improvement in managing their resources and increasing the efficiency of the firm. TATA motors was efficient for the first two years after which the firm's efficiency reduced and the firm started to rise again year on year.

**Table 1: Technical efficiency of Automobile companies**

| Firm | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Ashoka Leyland | 0.275 | 0.294 | 1 | 1 | 0.359 | 0.349 | 0.467 | 0.527 | 0.598 | 0.586 |
| 2. BAJAJ Auto | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 3. Hero moto corp | 0.889 | 1 | 0.911 | 1 | 0.905 | 0.964 | 0.968 | 0.855 | 0.922 | 0.861 |
| 4.Mothersons Sumi Systems Ltd | 0.815 | 1 | 0.302 | 0.271 | 0.286 | 0.293 | 0.340 | 0.313 | 0.220 | 0.203 |
| 5.TATA Motors | 1 | 1 | 0.419 | 0.475 | 0.508 | 0.462 | 0.499 | 0.572 | 0.545 | 0.613 |
| 6.TVS Motors | 0.479 | 0.452 | 0.486 | 0.497 | 0.543 | 0.585 | 0.687 | 0.662 | 0.075 | 0.715 |

Source: Author's compilation of DEA results.

### Association between efficiency and Foreign inflows:

As discussed earlier in the theoretical framework, one of the motive for attracting FDI in host country is the efficiency seeking FDI. The FDI inflows in the selective Automobile firms is taken from the financial reports of the firm. In the present study the foreign capital of the firm is taken from the respective firms shareholding pattern. The Foreign investment in to these firms include – Foreign institutional investors/ Foreign nationals, Foreign Portfolio investors, Non Resident Indians (NRIs), Investments in ADRs and GDRs.

In order to check the association between the efficiency and Foreign inflows, the ANOVA test is being conducted for both Efficiency and FDI inflows. The test to measure differences in efficiency of companies and difference in the foreign inflows of all the six companies is done using Single factor Anova.

**Table 2 ANOVA for Technical Efficiency of the firm**

| Groups | Count | Sum | Average | Variance |
|---|---|---|---|---|
| 1. Ashoka Leyland | 10 | 5.455 | 0.5455 | 0.070429 |
| 2. BAJAJ Auto | 10 | 10 | 1 | 0 |
| 3. Hero moto corp | 10 | 9.275 | 0.9275 | 0.002828 |
| 4.Mothersons Sumi Systems Ltd | 10 | 4.043 | 0.4043 | 0.073901 |
| 5.TATA Motors | 10 | 6.093 | 0.6093 | 0.045468 |
| 6.TVS Motors | 10 | 5.181 | 0.5181 | 0.032979 |

**ANOVA**

| Source of Variation | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 2.880221 | 5 | 0.576044 | 15.32002 | $2.32126E^{-09}$ | 2.38607 |
| Within Groups | 2.03044 | 54 | 0.037601 | | | |
| Total | 4.910661 | 59 | | | | |

The P value of 2.32126E-09 states, that the null hypothesis to be rejected. Therefore, it can be stated that there is a significant difference between the Technical efficiencies of the firm.

**Table 3 ANOVA for Foreign investments of the firm**

| Groups | Count | Sum | Average | Variance |
|---|---|---|---|---|
| 1. Ashoka Leyland | 10 | 4646902239 | 464690223.9 | 5.61506E+16 |
| 2. BAJAJ Auto | 10 | 405163915 | 40516391.5 | 1.79746E+14 |
| 3. Hero moto corp | 10 | 739547780 | 73954778 | 1.8317E+14 |
| 4.Mothersons Sumi Systems Ltd | 10 | 1097431675 | 109743167.5 | 9.06376E+15 |
| 5.TATA Motors | 10 | 8608548817 | 860854881.7 | 2.41452E+17 |
| 6.TVS Motors | 10 | 338165187 | 33816518.7 | 8.80819E+14 |

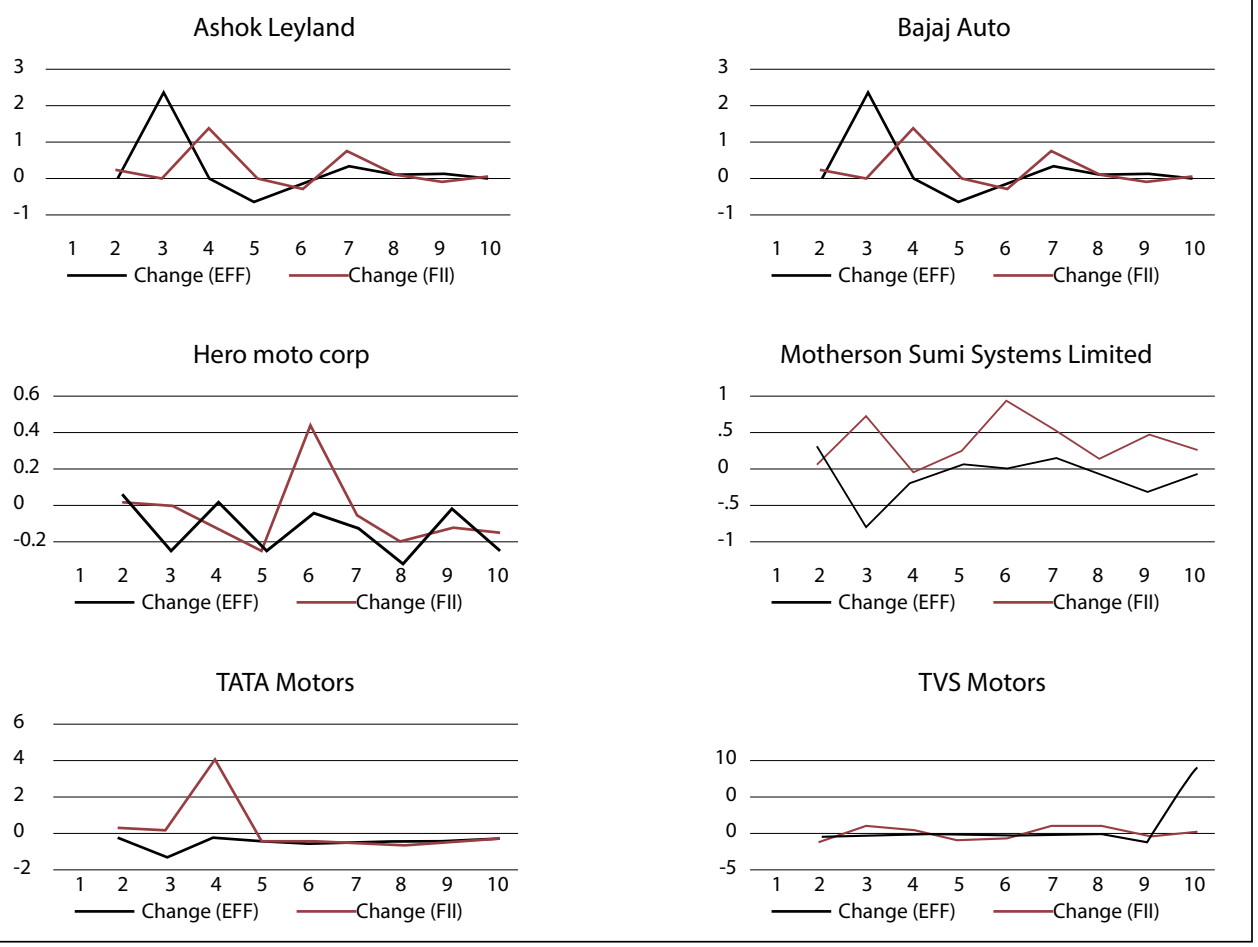
**ANOVA**

| Source of Variation | *SS* | *df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 5.59E+18 | 5 | 1.11871E+18 | 21.799 | 7.05E-12 | 2.38607 |
| Within Groups | 2.77E+18 | 54 | 5.13184E+16 | | | |
| Total | 8.36E+18 | 59 | | | | |

From the results obtained above it is clear that the P value for testing foreign inflows is 7.05E-12, this again states that there is a difference in the foreign inflows earned by the companies every year on year. Hence in both the above cases, the null hypothesis must be rejected, and alternative hypothesis can be accepted.

Further to understand the change in the efficiency levels of each company with their foreign investment inflows, the following graphs were plotted. These diagrams represent the change in the efficiency and foreign investment inflows of the selected six automobile companies for the last six years.

**Figure 1: Change in the efficiency and Foreign inflows**




Source: Authors compilation

## Correlation:

Correlation test is conducted individually to all the six firms, to test the relationship between change in the efficiency of the firm with the change in the foreign inflows of the firm.

**Table : 4 Correlation test is conducted individually to all the six firm**

| year | Ashoka Leyland | | BAJAJ Auto | | Hero moto corp | | Mothersons Sumi Systems Ltd | | TATA Motors | | TVS Motors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Change EFF | Change in FII | Change EFF | Change in FII | Change EFF | Change in FII | Change EFF | Change in FII | Change EFF | Change in FII | Change EFF | Change in FII |
| 2008-09 | | | | | | | | | | | | |
| 2009-10 | 0.0691 | 0.2341 | 0.0000 | -0.0386 | 0.1249 | 0.1082 | 0.2270 | 0.0253 | 0.0000 | 0.4930 | -0.0564 | -0.5867 |
| 2010-11 | 2.4014 | -0.0096 | 0.0000 | 0.2733 | -0.0890 | 0.0942 | -0.6980 | 0.6392 | -0.5810 | 0.3475 | 0.0752 | 1.2632 |
| 2011-12 | 0.0000 | 1.4347 | 0.0000 | 0.8044 | 0.0977 | 0.0183 | -0.1026 | 0.0000 | 0.1337 | 3.9847 | 0.0226 | 0.7132 |
| 2012-13 | -0.6410 | 0.0448 | 0.0000 | 0.0221 | -0.0950 | -0.0835 | 0.0554 | 0.2255 | 0.0695 | 0.0661 | 0.0926 | -0.4081 |
| 2013-14 | -0.0279 | -0.2528 | 0.0000 | 0.0993 | 0.0652 | 0.4079 | 0.0245 | 0.9176 | -0.0906 | 0.0537 | 0.0773 | -0.2644 |
| 2014-15 | 0.3381 | 0.7709 | 0.0000 | 0.0246 | 0.0041 | 0.0461 | 0.1604 | 0.6690 | 0.0801 | -0.0259 | 0.1744 | 1.5829 |
| 2015-16 | 0.1285 | 0.1694 | 0.0000 | -0.1931 | -0.1167 | -0.0569 | -0.0794 | 0.0873 | 0.1463 | -0.2164 | -0.0364 | 1.5323 |
| 2016-17 | 0.1347 | -0.0428 | 0.0000 | -0.2162 | 0.0784 | 0.0057 | -0.2971 | 0.4675 | -0.0472 | -0.0909 | -0.8867 | -0.0109 |
| 2017-18 | -0.0201 | 0.0669 | 0.0000 | 0.4787 | -0.0662 | -0.0174 | -0.0773 | 0.1884 | 0.1248 | 0.0418 | 8.5333 | 0.2815 |

TO check if any relationship exists between the change in the efficiency with the change in the foreign capital flows, the values are taken in the percentage change as year on year basis.

The results of the correlation have been summarised in the following table.

**Table 4: Correlation component of Automobile companies**

| Groups | correlation |
|---|---|
| Ashok Leyland | -0.112 |
| BAJAJ | 0.000 |
| Hero moto corp | 0.454 |
| Motherson Sumi Systems Limited | -0.244 |
| TATA | 0.164 |
| TVS | -0.047 |

The above results state that only Hero moto corp has got correlation coefficient as 0.454. This company's foreign inflows are having a positive relationship with efficiency of the firm. The firm has been able to attract increased foreign inflows by improving its technical efficiency. After Hero moto corp it is the Tata Motors who has been having some positive relationship with foreign inflows is about 0.164.

The negative correlation coefficient states that the increase in the efficiency of the firm has an inverse relationship with attracting foreign investments. In the present study Ashok Leyland, Motherson Sumi and TVS motors have Negative correlation with foreign inflows in their companies. Bajaj Auto since it is a benchmark firm for technical efficiency due to which we cannot arrive at correlation values.

### Scope for further research:

The method used for computing technical efficiency of the firm was two input one output based, input oriented constant returns to scale. This model is the basic model. Further the efficiency of the firm can even be studies by adopting to other established methods. The study can also be conducted for a large group of companies. Considering a sample for longer time period, to assess if we can identify the significant role of efficiency in attracting Foreign inflows in India.

## Discussion and Conclusion

Indian economy being the fastest growing economy and having initiated significant new initiatives and structural reforms, has been successful in attracting FDI(Shinde & Dubey, 2011). The largest portion of foreign investments flow to Indian Automobile sector. Efficiency is the method adopted to evaluate the performance of the firms, from the available secondary sources of data. This study was conducted to evaluate the relationship between the efficiency of the firms and the foreign investments. It was found from the study that the efficiency of the firms and foreign inflows were different across the period of the study, stating that there were changes in the performance of the firms and also foreign investments of the firm. Further it was also observed that Hero moto corp was the firm among the six,

which proved the hypothesis of relationship between efficiency and foreign investment inflows. Further the studies can be conducted to a larger sample size and test the role of efficiency seeking Foreign inflows in automobile sector.

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# Consumption Patterns and Customer Expectations towards Marine Fishery Products in Coastal Andhra Pradesh

**Dr. V.V. Devi Prasad Kotni***

## Abstract

*Marine fisheries sector forms an important sector for the Indian economy. It is not only contributing to the GDP of the country but also providing livelihood and providing food security for millions of Indians. In India, there are nine maritime states, two union territories and 1537 notified fish landing centres. According to the Census of 2010 by CMFRI, the total fishermen population was about 4 millions consisting of 0.86 million families. All of these fishermen are depending on the profession of catching and selling the marine fish. If these people are able to know the consumption patterns of the fish along with the customer expectations towards marine fishery products then it will be easy for the fishermen to offer their marine product mix to the market according the customer expectations. The primary aim of the research study is to empirically analyse the consumption patterns and customer expectations towards marine fishery products in coastal Andhra Pradesh. The study was conducted in the coastal area of the Andhra Pradesh state to read the expectations of the customers towards marine fishery products. The study found that the fishermen should process the fish according to the expectations of individual customer and organisational customer. It is strongly advised that the fishermen should decide first which type of customer they are selling fish, and then they should perform the value added activities as different type of customers are having different types of expectations.*

Keywords: Consumption patterns, Customer expectations, Factor analysis, Consumer behavior, Fish products and Marine fishery

## Introduction

In this exploratory research, an effort has been done to comprehend the expectations of the individual customers and organisational customers towards fish products. The objective of this analysis is to identify the value addition operations expected by individual and organisational customers and convey the same to the fishermen community so that the fishermen perform the same value added operations to satisfy the customer. Individual fish customers refer to consumer households for self consumption. Organisational fish customers refer to restaurants, hotels, dhabas, parcel counters/curry points etc.

The definition of value will be different from one person to another person. The value will be perceived by the fishermen (producer) differently when compare to the definition of value by the customer. The fishermen will perform the value chain activities according their perception of value. But the customer in the market may be expecting different thing from the fish products. In order to diminish this gap between fishermen perceptions and customer expectations, this particular analysis is done to find out the most expected fish product value added attributes by the customer which will be motivating the customers to purchase. If the fishermen are aware of what exactly the customer expectations are, then the fishermen may accordingly perform the value added operations. The concept of value chain analysis can also be applied to the fishery sector. Knowingly or unknowingly, there are so many fishermen involved in marine fishery value chain. In this study an attempt has been made to determine whether the customers prefer value additions to fish or not, if they prefer value added fish what type of value addition operations they are expecting to the marine fish.

Marine fisheries sector forms an important sector for the Indian economy. It is not only contributing to the GDP of the country but also providing livelihood and providing food security for millions of Indians. In India, there are nine maritime states, two union territories and 1537 notified fish landing centres. According to the Census of 2010 by CMFRI, the total fishermen population was about 4 millions consisting of 0.86 million families. All of these fishermen are depending on the profession of catching and selling the marine fish. If these people are able to know the consumption patterns of the fish along with the customer expectations towards marine fishery products then it will be easy for the fishermen to offer their marine product mix to the market according the customer expectations.

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## Literature review

According to IMARC Report (2020), it was found that the estimated worth of Indian fish market was INR 1,233 billion in 2019 and the driver of Indian fish market were increase in per capita income, organised food retail, health awareness and growth in exporting. Shashikanth and Somashekar (2020) revealed in their research that the per capita consumption of fish was found to be 25.9 kg per year in developed countries and 9.3 kg per year in developing countries; it has been found that the consumption of fish is more in developed countries than developing countries where the global per capita consumption of fish is found to be 19 kg per year. In India, the consumption of fish was increased from 8.8 kg per year in 1988 to 9 kg per year in 2000, 10 kg per year in 2020. In the same research, it was found that the fish consumers in India are consuming fish on daily basis (6.87%), fish consumption once in a week (30.39%), fish consumption once in a fortnight (29.42%), once in a month (18.62%) and occasional fish consumption (14.70%). Shyam (2020) found in their study that the average household consumption of fish was found to be 9.34 kg across low value fish 6.49 kg and high value fish 2.85 kg, and the expenditure was estimated at Rs.982.81 per kg. The restraining factors of fish consumption were found to be unavailability of preferred fishes, lack of quality fish, high prices, lack of fresh fish availability, accessibility to purchase sources, seasonality etc. Domingo et al., (2007) observed in their study that people consider fish to be a balanced and healthy diet to get the high nutrition values like vitamins and proteins. Hu et al., (2002) found out in their study that the fish consumers perceived that fish consumption will reduce the risk of coronary heart decease. Lund (2013) identified in their study that people understanding is that the consumption of fish will give the health benefits like increased cognitive development and weight control. Skytte and Blunch (2001) identified in their study that the aspects like price and food quality were the major concerns for food consumers. Schwedler and Johnson (2000) observed in their study that the fish consumers pay attention was towards the fish attributes like appropriate farms planning and management, healthy fish products, well-being of farmed fishes etc. Verbeke et al., (2007) noticed that the fish consumers look forward for the attributes like convenience, taste, brand knowledge and price while purchasing fish products. Rajani (2010) analysed that the consumers were influenced by the attributes of fish products like natural, fresh, nutritious, knowledge, price and availability during selection of fish and its purchase.

### Objectives of the study

The primary aim of this empirical research is to analyse the consumption patterns and customer expectations towards marine fishery products in coastal Andhra Pradesh. The study was conducted in the coastal area of the state of Andhra Pradesh to read the expectations of the customers towards marine fishery products. The study also focuses light on demographics of the customers consuming marine fish along with their consumption patterns in the study area.

## Methodology

Respondents: Individual Customers and Organizational Customers of fish.

Sample Size: 500 Individual Customers and 50 Organizational Customers.

Sampling Method: Purposive Sampling.

Study Area: Coastal Andhra Pradesh [9 cities in 9 distinct head quarters]

Data Capture Method: Field Survey.

Data Capture Instrument: Structured Questionnaire.

The people who consume fish they are considered as respondents for this research study. The selection of the study area is on the basis of importance of the marine fish landing centers/villages and fish consumption centers cities/district head quarters among all nine coastal districts of Andhra Pradesh i.e. Nellore, Prakasam, Guntur, Krishna, West Godavari, East Godavari, Visakhapatnam, Vizianagaram and Srikakulam.

In fish market there are two types of customers can be found. They are individual customers and organisational customers (Hotels and Restaurants). This research paper is divided into two parts.

Analysis of Individual Customer Expectations.

Analysis of Organisational Customer Expectations.

Two structured questionnaires have been designed separately to elicit the expectations of individual customers as well as organisational customers depending on the objective of the analysis. These two questionnaires measure the customer expectations towards fish on certain parameters on a five-point-likert-scale which were identified from the field observations and interviews.

The cronbach alpha value computed for both the questionnaires in order to determine the reliability of data. The $\alpha$ value is found to be 0.753 for individual customer questionnaire data and $\alpha$ is 0.714 for organisational customer questionnaire data where the threshold value is 0.70 : (Bernardi, 1994).

Factor analysis statistical tool was executed on the primary data collected from both individual and organisational customers in form of expectations towards fish. KMO (Kaiser-Meyer-Olkin) measure and Bartlett's Test of Sphericity was executed on the data in order to determine the appropriateness of application of factor analysis. KMO test must be significant and Bartlett's Test of Sphericity coefficient must be more than 0.05 is desirable: (Akansha Anchaliya et al., 2012).

## Findings and Discussions

Analysis of individual customer expectations towards fish products

In this section analysis of individual customer expectations towards fish products are analysed. The questionnaire of individual customer expectations is designed to record the customer expectations towards 20 attributes of fish products attributes and also it reads a brief demographic profile of individual customer and along with their purchase behaviour. The sample size for this analysis, as mentioned in the first chapter, is 500 (0.010% of population living in district head quarters cities of coastal districts of Andhra Pradesh). The respondents are selected from fish markets in district head quarters city of each coastal district.

### Demographic profile of individual fish customers in the study area:

The Demographic characteristics of the respondents (individual customers) were analysed which help the fishermen and fish marketers to design marketing polices and strategies like 4P strategy, STP strategy etc.

**Table 1: Demographic Profile of Customers**

| Variable | Categories of variable | Frequency | % |
|---|---|---|---|
| Gender | Male | 275 | 55.00% |
| | Female | 225 | 45.00% |
| Age | 13 - 19 years (teenagers) | 34 | 6.67% |
| | 20 - 30 years (young-age) | 208 | 41.67% |
| | 31 - 40 years (early-middle-age) | 158 | 31.67% |
| | 41 - 50 years (late-middle-age) | 75 | 15.00% |
| | above 50 years (old-age) | 25 | 5.00% |
| Occupation | Unemployed / Students | 50 | 10.00% |
| | Employed | 358 | 71.67% |
| | Business people | 92 | 18.33% |
| Education | Primary Education | 8 | 1.67% |
| | Secondary Education | 27 | 5.33% |
| | Higher Secondary / Diploma / ITI | 97 | 19.33% |
| | Graduation (UG) | 200 | 40.00% |
| | Post Graduation (PG) | 147 | 29.33% |
| | Higher than PG | 21 | 4.33% |
| Income Per month | < Rs.15,000/- | 125 | 25.00% |
| | Rs.15,000/- to Rs.30,000/- | 225 | 45.00% |
| | Rs.30,000/- to Rs.50,000/- | 85 | 17.00% |
| | > Rs.50,000/- | 65 | 13.00% |
| Size of Family | Two | 72 | 14.33% |
| | Three | 137 | 27.33% |
| | Four | 250 | 50.00% |
| | Five | 33 | 6.67% |
| | Six | 8 | 1.67% |

Source: field work

The demographic analysis of individual fish consumers are presented in the Table 1. The data related to the demographic profile of the customers are gathered from the field survey through a structured questionnaire.

- It was found from the primary data collected from the respondents, 55% (275 respondents) are male and 45% (225 respondents) are female.
- In the Age group analysis, 34 (6.67 percent) customers are teenagers (13 – 19 years), 208 (41.67 percent) are of young age group (20 – 30 years), 158 (31.67 percent) are of early middle age group (31 – 40 years), 75 (15 percent) are of late middle age group (41 – 50 years) and 25 (5 percent) customers are of old age group (above 50 years).
- In the occupation analysis of fish consumers, unemployed/students are 50 (10 percent) consumers, employed 358 (71.67 percent) and business people 92 (18.33 percent).
- In the educational analysis of fish consumers, 8 (1.67 percent) consumers has completed their primary education, 27 (5.33 percent) had secondary education, 97 (19.33 percent) had completed their higher secondary education, 200 (40 percent) were graduated, 147 (29.33 percent) had post graduation qualification and 21 (4.33 percent) had finished their higher post graduation studies.
- In the income analysis of fish consumers, 125 (25 percent) consumers' income per month less than or equal to Rs.15,000/-, 225 (45 percent) consumers' income Rs.15,000/- to Rs.30,000/-, 85 (17 percent) consumers' income Rs.30,000/- to Rs.50,000/-, 65 (13 percent) consumers' income more than Rs.50,000/-.
- In the size of family analysis, 72 (14.33%) consumers' family size is two, 137 (27.33%) consumers' family size is three, 250 (50%) consumers' family size is four, 33 (6.67 percent) consumer's family size is five and 8 (1.67 percent) of consumers are having family size six.

### Purchase Behaviour towards the product fish:

In the analysis of purchase behaviour of the fish

consumers, a series of variables pertaining to fish consumer purchase behaviour are identified and analysed in the Table 2.

**Table 2: Consumption Behaviour of fish consumers**

| Variable | Categories of variable | No. | % |
|---|---|---|---|
| Frequency of purchase of Fish | Daily | 30 | 6.00% |
| | Weekly | 183 | 36.67% |
| | Biweekly | 78 | 15.67% |
| | Monthly | 97 | 19.33% |
| | Bimonthly | 37 | 7.33% |
| | as per requirement | 75 | 15.00% |
| Most preferred day of Eating fish | Sunday | 225 | 45.00% |
| | Tuesday | 98 | 19.67% |
| | Friday | 34 | 6.67% |
| | as per requirement | 143 | 28.67% |
| amount spent per month | less than Rs.500/- | 132 | 26.33% |
| | between Rs.500/- to Rs.1000/- | 212 | 42.33% |
| | between Rs.1000/- to Rs.2000/- | 123 | 24.67% |
| | more than Rs.2000/- | 33 | 6.67% |
| distance from home to outlet | less than 1 k.m. | 217 | 43.33% |
| | between 1 k.m. and 3 k.m. | 167 | 33.33% |
| | between 3 k.m. and 5 k.m. | 56 | 11.33% |
| | between 5 k.m. and 10 k.m. | 40 | 8.00% |
| | more than 10 k.m. | 20 | 4.00% |
| Family Life Cycle Stage | Young Couple with no children | 67 | 13.33% |
| | Couples with children | 250 | 50.00% |
| | Couple-with-working-children | 150 | 30.00% |
| | Old-Couple-working-children -with-kids | 26 | 5.33% |
| | Old-Couple-staying-away -from-children | 7 | 1.33% |

Source: field work

The purchase behaviour of the individual fish consumers is presented in the Table 2.

- The frequency of purchase of fish is observed as daily for 30 (6 percent) customers, weekly for 183 (36.67 percent), biweekly for 78 (15.67 percent), monthly for 97 (19.33 percent), bimonthly for 37 (7.33 percent) customers and 75 (15 percent) customers are consuming fish as and when they require.
- Most preferred day for fish purchase is analysed as Sunday for 225 (45 percent) customers, Tuesday for 98 (19.67 percent), Friday for 34 (6.67 percent) and 143 (28.67 percent) of the consumers' preferred time of fish consumption is as and when the customers require.
- The amount spent per month for purchase of fish is less than Rs.500/- for 132 (26.33 percent) customers, 212 (42.33 percent) of the consumers are spending Rs.500/- to Rs.1000/-, 123 (24.67 percent) are spending Rs.1000/- to Rs.2000/- and 33 (6.67 percent) customers are spending an amount more than Rs.2000/- per month.
- The distance between fish outlet and consumer point is analysed, 217 (43.33 percent) consumers willing to purchase fish within less than 1 k.m. radius, 167 (33.33 percent) consumers willing to purchase fish from 1 k.m. and 3 k.m., 56 (11.33 percent) consumers are willing to purchase fish within 3 k.m. and 5 k.m., 40 (8 percent) consumer are willing to purchase fish within 5 k.m. to 10 k.m. and only 20 (4 percent) consumers are willing to purchase fish more than 10 k.m.
- In the customer-life-cycle-stages analysis, young-couple-without-children are 67 (13.33 percent), couple-with-children are 250 (50 percent), couple-with-working-children are 150 (30 percent), old-couple-with-working-children with kids are 26 (5.33 percent), old-couple-staying-away-from-children are 7 (1.33 percent).

## Performing Factor Analysis on expectations of the individual customers towards fish products

The multi-variate statistical tool factor analysis was applied on the data of consumer expectations towards fish products. The consumer expectations are recorded through the data capture instrument (structured questionnaire) on a five-point-likert-scale ([5] Highly-Expected, [4] Expected, [3] Slightly-Expected, [2] Unexpected, [1] Highly- Unexpected) on twenty variables. In order to proceed for performing factor analysis, the data reliability test was performed. The Cronbach's Alpha value is found to be 0.753 which means the data of customer expectations towards fish is 75.3% reliable.

## Reliability of Data: Kaiser Meyer Olkin (KMO) and Bartlett's Test for Individual Customer Expectations

**Table 3: KMO and Bartlett's Test for Individual Customer Expectations**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | 0.842 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 6421.415 |
| | Df | 190 |
| | Sig. | .000 |

Source: Output of Factor Analysis

The Table 3 shows the results of Bartlett's Test and Kaiser Meyer Olkin (KMO) test which determines the appropriateness of applying factor analysis on the customer expectations data. The KMO value is found to be 0.842 which is more than the threshold value of 0.5 (Hair et al., 1998) and Bartlett's Test of Spherincity ($X^2$ =6421.415) is found to be significant ($p < .001$, df 190).

Finally it can be noticed that the data of consumer expectations towards fish products is appropriate for factor analysis. The factor analysis was applied using principle component extraction method with varimax rotation.

## Factors – Individual Customer Expectations towards fish product

**Table 4: Factors – Individual Customer Expectations**

| Factor | Eigen Values | % Total variance | Cumulative % |
|---|---|---|---|
| Quality | 5.415 | 26.15 | 26.15 |
| Retail Outlet | 2.845 | 14.89 | 41.04 |
| Decision Making Advice | 2.148 | 11.12 | 52.16 |
| Type of Fish | 1.547 | 8.56 | 60.72 |
| Price | 1.324 | 6.45 | 67.17 |
| Type of Catch | 1.105 | 5.02 | 72.19 |

Source: Output of Factor Analysis

After executing factor analysis, the twenty (fish product attributes) variables were decreased to six factors, which explained 72.19 percent of cumulative variance which is showing that the variance of actual values was well captured by six factors as shown in Table 4. The six factors are conceptually named as Quality, Retail outlet, Decision Making Advice, Types of fish, Price and Type of Catch. The factor scores of customer expectations are presented in the Table 5.

The factor scores matrix of customer expectations towards fish and it's associated variables in all the six factors and their relative factor scores as presented in Table 5. The factor scores in the matrix represent the priority of customer expectations towards fish.

- The first generated factor is named as QUALITY with an Eigen value of 5.415, variance of 26.15 percent and four associated variables. The variables are Quality fish (factor score 0.87), Freshness (0.81), Cleanliness (0.70) and Safety and security (0.50). Hence it can be concluded that the most expected fish product attributes by the customers are related to quality.
- The second generated factor is named as RETAIL OUTLET with an Eigen value of 2.845, variance of 14.89 percent and four associated variables. The variables are Retail outlet Ambience (0.81), Nearer to home (0.74), Appearance of fish outlet (0.65) and Credit Facility (0.53). The fish retail outlet which is having these qualities is the second most expected attribute by the customer to purchase fish.
- The third generated factor is named as DECISION MAKING ADVICE with an Eigen value of 2.148, variance of 11.12 percent and three associated variables. The variables are Species Variety (0.80), Family members' advice (0.71) and Retailer Advice (0.55). The customers are taking purchase decisions

**Table 5: Factor Scores Matrix – Individual Customer Expectations**

| S.No | Product Attributes | Quality | Retail | Decision Outlet | Type Making Advice | Price of fish | Type of Catch |
|---|---|---|---|---|---|---|---|
| 1 | Quality Fish | 0.87 | | | | | |
| 2 | Freshness | 0.81 | | | | | |
| 3 | Cleanliness | 0.70 | | | | | |
| 4 | Safety and Security | 0.50 | | | | | |
| 5 | Retail outlet ambience | | 0.81 | | | | |
| 6 | Nearer to home | | 0.74 | | | | |
| 7 | Appearance of fish in outlet | | 0.65 | | | | |
| 8 | Credit facility | | 0.53 | | | | |
| 9 | Species Variety | | | 0.80 | | | |
| 10 | Retailer Advice | | | 0.71 | | | |
| 11 | Family Members Advice | | | 0.55 | | | |
| 12 | Branded fish | | | | 0.80 | | |
| 13 | Frozen/Iced fish | | | | 0.60 | | |
| 14 | Chopped fish | | | | 0.51 | | |
| 15 | Reasonable price | | | | | 0.81 | |
| 16 | Value for money | | | | | 0.70 | |
| 17 | Date of Catch | | | | | | 0.79 |
| 18 | Place of Catch | | | | | | 0.69 |

Source: Author's compilation of DEA results.

basing on these attributes.

- The fourth generated factor is named as TYPE OF FISH with an Eigen value of 1.547, variance of 8.56 percent and three associated variables. The variables are Branded fish (0.80), Frozen/Iced fish (0.60) and Chopped fish (0.51). Hence it can be concluded that the customers are motivated by these types of fish in the market.
- The fifth generated factor is named as PRICE with an Eigen value of 1.324, variance of 6.45 percent and two associated variables. The variables are Reasonable price (0.81) and Value for Money (0.70). Therefore it can be concluded that the customers are expecting the prices of the fish to be reasonable and the fish product should deliver value for money to customers.
- The sixth generated factor is named as TYPE OF CATCH with an Eigen value of 1.105, variance of 5.02 percent and two associated variables. The variables are Date of Catch (0.79) and Place of Catch (0.69). The customers have certain expectations towards type of catch basing on which they are taking the purchase decisions.

Two variables, Frozen Boneless fish and Non-value added fish are eliminated while executing factor analysis that means the customers are not expecting Frozen Boneless fish (readily available boneless fish made by producer) and also not expecting Non-value added fish (fish without processing) from the market and customers will avoid such kind of products.

## Analysis Of Organisational Customer Expectations Towards Fish Products

In this section, analysis of Organisational customer expectations are analysed towards fish products. The questionnaire of Organisational customer expectations is designed in such a way that it records the customer expectations towards fifteen fish product attributes. The sample size for this analysis, as mentioned in the first chapter, is 50 (10% of Individual Customers Sample). The respondents are hotels, restaurants, dhabas etc from district head quarters city of each coastal district.

## Performing Factor Analysis on expectations of the organisational customers towards fish product

The multi-variate statistical tool factor analysis was applied on the data of organisational consumer expectations towards fish products. The consumer expectations are recorded through the data capture instrument (structured questionnaire) on a five-point-likert-scale ([5] Highly-Expected, [4] Expected, Slightly-Expected, [2] Unexpected, [1] Highly-Unexpected) on twenty variables. In order to proceed for performing factor analysis, the data reliability test was performed. The Cronbach's Alpha value is found to be 0.714 which means the data of customer expectations towards fish is 71.4% reliable.

## Reliability of Data: Kaiser Meyer Olkin (KMO) and Bartlett's Test for Organisational Customer Expectations

**Table 6: KMO and Bartlett's Test for Organisational Customer Expectations**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | 0.606 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 227.153 |
| | Df | 91 |
| | Sig. | .000 |

Source: Output of Factor Analysis

The Table 6 shows the results of Bartlett's Test and Kaiser Meyer Olkin (KMO) test which determines the appropriateness of applying factor analysis on the organisational customer expectations data. The KMO value is found to be 0.606 which is more than the threshold value of 0.5 (Hair et al., 1998) and Bartlett's Test of Spherincity ($X^2$ =227.153) is found to be significant ($p < .001$, df 190).

Finally it can be noticed that the data of organisational consumer expectations towards fish products is appropriate for factor analysis. The factor analysis was applied using principle component extraction method with varimax rotation.

## Factors – Organisational Customer Expectations towards fish product

**Table 7: Factors – Organisational Customer Expectations**

| Factor | Eigen Values | % Total variance | Cumulative % |
|---|---|---|---|
| Type of Processing | 3.498 | 24.98 | 24.98 |
| Quality | 1.929 | 13.77 | 38.75 |
| Type of Fish | 1.903 | 13.59 | 52.34 |
| Storage | 1.260 | 8.99 | 61.33 |

Source: Output of Factor Analysis

After executing factor analysis, the fifteen (fish product attributes) variables were decreased to four factors, which explained 61.33 percent of cumulative variance which is showing that the variance of actual values was well captured by four factors as shown in Table 7. The six factors are conceptually named as Type of processing, Quality, Type of fish and Storage. The factor scores of customer expectations are presented in the Table 8.

Factor Scores Matrix – Organisational Customer Expectations

**Table 8: Factor Scores Matrix – Organisational Customer Expectations**

| S.No | Attributes Processing | Type of Quality | | Type of fish | Storage | | |
|---|---|---|---|---|---|---|---|
| 1 | Boneless fish | 0.83 | | | | | |
| 2 | Removal of Slime | 0.82 | | | | | |
| 3 | Chopped fish | 0.81 | | | | | |
| 4 | Deheaded fish | 0.79 | | | | | |
| 5 | Fish without fins | 0.64 | | | | | |
| 6 | Freshness | | 0.80 | | | | |
| 7 | Cleanliness | | 0.69 | | | | |
| 8 | Safety & Security | | 0.51 | | | | |
| 9 | Species | | | 0.73 | | | |
| 10 | Place of Catch | | | 0.65 | | | |
| 11 | Date of Catch | | | 0.62 | | | |
| 12 | Appearance of fish | | | 0.60 | | | |
| 13 | Quality of Storage | | | | 0.73 | | |
| 14 | Storable & Non Perishable | | | | 0.66 | | |

Source: Author's compilation of DEA results.

The factor scores matrix of organisational customer expectations towards fish and it's associated variables in all the four factors and their relative factor scores as represented in Table 8. The factor scores in the matrix represent the priority of organisational customer expectations towards fish.

- The first generated factor is named as TYPE OF PROCESSING with an Eigen value of 3.498, variance of 24.98 percent and five associated variables. The variables are Boneless fish (factor score 0.83), Removal of Slime (0.82), Chopped fish (0.81), Deheaded fish (0.79) and Fish without fins (0.64). Hence it can be concluded that the most expected fish product attributes by the organisational customers are related to types of processing.
- The second generated factor is named as QUALITY with an Eigen value of 1.929, variance of 13.77 percent and three associated variables. The variables are Freshness (0.80), Cleanliness (0.69) and Safety & Security (0.51). The quality of fish is the second most expected attribute by the organisational customer to purchase fish.
- The third generated factor is named as TYPE OF FISH with an Eigen value of 1.903, variance of 13.59 percent and four associated variables. The variables are Species (0.73), Place of catch (0.65), Date of catch (0.62) and Appearance of Fish (0.60). The customers are taking purchase decisions basing on these product attributes.
- The fourth generated is named as STORAGE with an Eigen value of 1.260, variance of 8.99 percent and two associated variables. The variables are Quality of storage (0.73) and Storable & Non perishable (0.66). Hence it can be concluded that the customers are motivated by these types of fish in the market.

One variable, Non-value added fish is removed while executing factor analysis that means the organisational customers are not expecting Non-value added fish (fish without processing) from the market and customers will avoid such kind of products.

## Suggestions and Conclusions

In this research an analysis has been made to analyse the individual and organisational customer expectations towards fish products. The analysis is carried out separately for individual customer expectations and organisational customer expectations. The objective of this analysis is to identify the value additions expected by the customers and convey the same to the fishermen community so that the fishermen perform the same value added operations to satisfy the customer.

From analysis of expectations of individual customers, it can be concluded that the most expected value additions are

- **Quality** (Quality Fish, Freshness, Cleanliness, Safety and Security).
- **Retail Outlet** (Retail outlet ambience, Nearer to home, Appearance of fish in outlet and Credit facility).
- **Decision Making Advice** (Species Variety, Retailer Advice and Family Members Advice).

- **Type of fish** (Branded fish, Frozen/Iced fish and Chopped fish).
- **Price** (Reasonable price and Value for price).
- **Type of Catch** (Date of Catch and Place of Catch).

**From analysis of expectations of organisational customers,** it can be concluded that the most expected value additions are

- **Type of processing** (Boneless fish, Removal of Slime, Chopped fish, Deheaded fish and Fish without fins).
- **Quality of Fish** (Freshness, Cleanliness and Safety & Security)
- **Type of Fish** (Species type, Place of Catch, Date of Catch and Appearance of fish)
- **Storage** (Quality of Storage, Storable and Non Perishable fish)

The fishermen should process the fish according to the expectations of individual customer and organisational customer. It is strongly advised that the fishermen should decide first which type of customer they are selling fish, and then they should perform the value added activities. Because it is identified from the study that individual customer expectations and organisational customer expectations are found to be different. Hence, if the fishermen are selling fish to individual customer, the value chain management operations should be different, otherwise, if the fishermen are selling fish to organisational customer, the value chain management operations should be different i.e. according the expectations of target customers.

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