

## **Analytical Hierarchy Process-Based Analysis of Growth Drivers for the Food Processing Industry in India**

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### **ABSTRACT**

*A strong and dynamic food processing sector plays a considerable role in the overall economic growth of a country. Food processing is the conversion of raw material into food or of food into other forms, by physical or chemical means. Since the establishment of the ministry of food processing industry in 1988, the food processing industries acknowledged close attention of this sector. To make India as a World Food Factory by creating a competitive framework for the growth of food processing sector along with state government is the vision of the model policy. The model policy suggested States to allot land on priority basis for Mega Food Parks (MFPs) to promote Agriculture & Food Processing Industry. The aim of this study is to identify and evaluate the growth factor affecting the food processing industry in India. The Analytical hierarchy process (AHP) has been used in this research.*

**Keywords:** Food Processing Industry (FPI), Mega Food Parks (MFPs), Analytical hierarchy process (AHP).

### **INTRODUCTION:**

A strong and dynamic food processing sector plays a considerable role in the overall economic growth of a country. Food processing is the conversion of raw material into food or of food into other forms, by physical or chemical means. It produces marketable food products that can be prepared instantly and liked by the consumers. The term 'food processing' is mainly defined as a process of value addition to the agricultural or horticultural produce by various methods like grading, sorting and packaging (MOFPI). Food processing is a process in which food is prepared for consumption. The sector employed large numbers of people, many of whom are unskilled laborers. Since the establishment of the ministry of food processing industry in 1988, the food processing industries acknowledged close attention of this sector. Food sector has the large chain of industries producing inputs & commodities. In developing economies, food processing industries play a vital role by generating employment and income opportunities. The sub sector generates backward employment linkages by creating markets for raw materials and forward employment linkages, as people engaged in the supply of processed food (Tisimia, 2014). Food processing industries include cannery, meat packing plant, fish processing, slaughterhouse, food packing plants and sugar industry etc.

### **SEGMENTS OF FOOD PROCESSING SECTOR:**

The food processing sector mainly comprises of three segments on the basis of processing.

- **Primary food processing:** Primary industries process raw foods (e.g. wheat into flour). It comprises sorting, grading and packaging of vegetables & fruits, rice, milk, spices etc.
- **Secondary food processing:** Secondary industries use primary products to manufacture other foods (e.g. flour into bread). It comprises re-shaping the food for ease of consumption, which includes flour, oil cakes, and beverages powder and tea leaf.

- **Tertiary food processing:** Tertiary processing of food/ Value Added food segment includes processed fruits, vegetables, jams, juices. These industries produce prepared convenience foods such as frozen dinners or canned soup.

### **INDIA- THE GLOBAL FOOD PROCESSING HUB:**

The Indian Economy is depending deeply on agriculture, and this is probably to continue in the near future. The sturdy agriculture base, abundant livestock, cost competitiveness, liberalization and the growth of organized retail market made it attractive investment destination for global players and provides a remarkable potential for the food processing industry. India ranks number one in the production of food globally. The Agriculture and Allied Sector of India contributed approximately 13.9% of India's GDP (at constant 2004-05 prices) during 2013-14 and engages about 50% of the workforce. Changing demographic patterns, food habits, rise in income levels and diverse agro-climatic regions coupled with an enviable share of the world's agriculture produce opens up frequent opportunities in this sector make India as a large consumer market and a probable sourcing hub to the world. India's Food exports were expected to increase by 72.8 percent over 2008 to USD 24.25 billion in 2013 (Business Monitor International). The Food Processing Industry is of huge significance for Indian economy because of the fundamental linkages and synergies that it promotes between the two pillars of the economy, namely Agriculture and Industry (MOFPI).

### **POLICY REGIME FOR DEVELOPMENT OF FOOD-PROCESSING FIRMS:**

The Ministry of Food Processing Industries would work along with the state in creating a favorable environment for strong growth of the food processing sector (MOFPI). The main objective of this policy model is to position India as the most preferred investment destination for food processing industry with more opportunities to create employment and remunerative return for farmers. The policy aims for the sustainable growth of the sector and food processing industry has been identified as a driving force for development, which provides value-addition and improved utilization of agriculture, from farm to fork. To make India as a World Food Factory by creating a competitive framework for the growth of food processing sector along with state government is the vision of the model policy. The model policy suggested States to allot land on priority basis for Mega Food Parks (MFPs) to promote Agriculture & Food Processing Industry. The Food Parks and Mega Food Parks shall have modern infrastructure facilities. It will include creation of processing infrastructure near the farm, transportation, logistics and centralized processing centers (GOI). Prior to MFPs the MOFPI had launched Central Sector Food Park Scheme during eighth five year plan. But this scheme had not been successful in its objectives, so the MOFPI had launched a new scheme of MFPs in the tenth five year plan. Under the scheme, the MOFPI gives a grant up to Rs.50 crore to build a mega food park with minimum land area of 50 acres with at least Rs. 50 crore investments from the mega food developer. For the purpose of credit to designate the food parks, Government of India has set up a "Food Processing Fund". Under the new manufacturing policy of 2011, food processing industry is recognized as the priority sector. Government permitted 100% FDI under the automatic route in food processing industries. According to the recent guidelines of Reserve Bank of India (RBI), food processing infrastructure has been considered as the priority sector for lending. The cheap credit would support the food processing industries to compete globally and enhance the growth rate (ASSOCHAM, 2017).

### **OBJECTIVE OF THE STUDY:**

The objective of this study is to identify and evaluate the growth factors affecting the food processing industry in India by using the Analytical Hierarchy Process (AHP). There are numerous studies has been done which summarizes the application of Analytic Hierarchy Process (AHP) model in decision making in food processing industries.

### **RELATED RESEARCH:**

There are few studies conducted by researcher in the field of Agriculture and food processing by using AHP technique are Kallas, Z., et al (2009) assessed the decision regarding the adoption of organic farming practices. The study measured the farmers' objectives of risk preference and agricultural policies by using Analytical hierarchy Process (AHP). The farm level data had been collected through questionnaire from Vineyard holdings

in the Spanish region of Catalonia. The results revealed that farmers who are not risk averse are more prone to adopt organic farming.

Huafeng, (2010) has pinpointed the features of agro processing products of Anhui. According to the researcher, to boost the growth of agro processing industry in the province, it should choose those industries, which use grain, oil, cotton, bamboo, wood as raw materials, as the leading industries. For the analysis Analytical Hierarchy Process (AHP) evaluation model had been used. The results demonstrated that in Anhui province, Agro-food processing industry is at ranked first, followed by the textile industry, footwear and cap manufacturing, timber processing. In the nutshell, good planning & policies, concentration of infrastructure play an effective role in the social & rural development of Anhui.

Rochman, N., T., et al (2011) focused on the application of nanotechnology in agro industries opens vast opportunities for increasing the competitiveness. In their study researchers had reviewed five agro industries, which have applied nanotechnology. They had used SWOT- AHP (strength, weakness, opportunity, threat, and analysis hierarchy process) to verify the position of the competitiveness of each industry.

Zarei, M., & Paghaleh, M.j., (2011) envisaged that dynamic business environment is needed to maintain to formulate appropriate strategies for the business growth. The food industry business is trap with this environment. The reserchers had used the integrated deployment of freeman model by using SWOT matrix and AHP. The objective of the study was to formulate the strategies of food firms. In the study main and sub criterion in a food industry are scored and recognized as SWOT. The results proved that the export strategy is the first priority.

Pipatprapa, A., et al (2016) in their article on food industry used the structural equation modeling (SEM) and a fuzzy analytic hierarchy process (FAHP) to investigate the factors suitable for evaluating the environmental performance of Thailand's food industry. A first stage questionnaire survey was conducted with 178 managers of food industry and second stage questionnaire measured 18 experts regarding environment performance. The results of the SEM study showed that quality management, market orientation, and innovation capability have a significantly positive effect on environmental performance and the FAHP showed that the experts were most concerned about quality management.

Ramlan, R., et al (2016), analyzed that to determine the profitability and performance of small and medium enterprises in food processing industry the selection of good supplier is an important determinant. The main objective of the study was to determine ideal criteria of suppliers selection for food processing industry by using Analytical Hierarchy Process (AHP) technique by filling questionnaire from 50 SMEs food processing industries. The result of the study showed that criteria for supplier selection are ranked by cost, quality service, delivery and management.

## **SOURCES AND METHODOLOGY:**

To review the relevant literature, research papers have been collected from the referred Journals of economics, Journal on food processing & technology, International food research journal, the working papers of prestigious institutes worldwide and also the few dissertations of different universities etc. The Analytical Hierarchy Process (AHP) has been used in the study.

## **SELECTING GROWTH DRIVERS TO FOOD PROCESSING INDUSTRY IN INDIA BASED ON THE ANALYTIC HIERARCHY PROCESS:**

### **ANALYTICAL HIERARCHY PROCESS EVALUATION MODEL:**

American operational research expert A.L. Saaty in 1970s had proposed Analytical Hierarchy Process. AHP is both qualitative & quantitative method of decision analysis. With the help of AHP model policy makers can make decisions in complex situation through quantitative process. AHP is used, when the expert advice is more important than the decision making by data availability. AHP model has been applied in different fields such as strategic planning, facility location selection, software selection, project management, managing risk in supply chain, suppliers' selection, inventory classification, risk evaluation, assessing renewable energy sources etc. The basic steps of Analytical hierarchy process are:

- (1) To establish a hierarchical model.
- (2) Pair wise comparison matrix structure.
- (3) Calculate the weight vector and a consistency test.
- (4) Calculate the right combination of vector and do mix consistency test.

**EMPIRICAL ANALYSIS:**

Under the empirical analysis the following comparison scale i.e. Saaty’s 1-9 scale has been used.

**COMPARISON SCALE (SAATY’S 1-9 SCALE):**

Scale/ Intensity of Importance	Importance of an attribute
1	A equal to B
3	A is important than B
5	A is more important than B
7	A is strongly more important than B

**RESULTS & DISCUSSION:**

After filling the questionnaire from different scholars and experts, then compile the data filled in these questionnaires into the input table. Table 7.1 shows the compiled data of the entire filled questionnaire.

**INPUT TABLE (Table 7.1)**

Growth Drivers	Govt. Initiatives	Strong Domestic Demand	Rising Export Opportunities	Supply Side Advantage	Market Potential	Global Outsourcing Hub	Supply Chain Infrastructure	Contract Farming
1. Govt. Initiatives	1	7.00	0.20	0.14	0.11	0.20	0.14	9.00
2. Strong Domestic Demand	0.14	1	7.00	5.00	3.00	1.00	5.00	0.20
3. Rising Export Opportunities	5.00	0.14	1	7.00	1.00	0.33	0.20	9.00
4. Supply Side Advantage	7.14	0.20	0.14	1	9.00	7.00	0.33	0.20
5. Market Potential	9.00	0.33	1.00	0.11	1	7.00	7.00	9.00
6. Global Outsourcing Hub	5.00	1	3.00	0.14	0.14	1	0.14	7.00
7. Supply Chain Infrastructure	7.14	0.20	5.00	3.00	3.00	7.00	1	7.00
8. Contract Farming	0.11	5.00	5.00	5.00	5.00	0.14	0.14	1
<b>Total</b>	<b>34.53</b>	<b>14.87</b>	<b>22.34</b>	<b>21.39</b>	<b>22.25</b>	<b>23.67</b>	<b>13.95</b>	<b>42.4</b>

The proportionate table (Table 7.2) has been drawn from the input table (Table 7.1). The proportionate table shows the proportion of each growth driver with the individual growth driver. From the following proportionate table the average value of each growth driver is to be calculated.

**Proportionate Table (Table 7.2)**

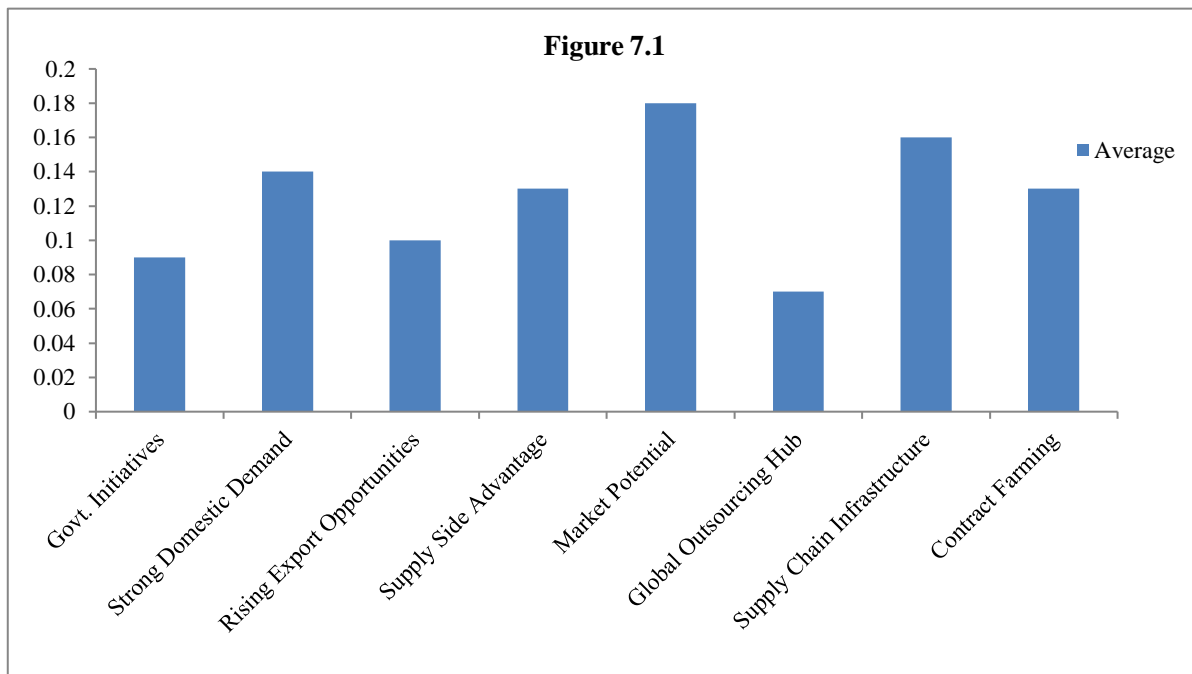
Growth Drivers	Govt. Initiatives	Strong Domestic Demand	Rising Export Opportunities	Supply Side Advantage	Market Potential	Global Outsourcing Hub	Supply Chain Infrastructure	Contract Farming	Average
1. Govt. Initiatives	0.03	0.47	0.008	0.006	0.005	0.008	0.01	0.212	0.09
2. Strong Domestic Demand	0.004	0.067	0.313	0.233	0.134	0.042	0.358	0.004	0.14
3. Rising Export Opportunities	0.144	0.009	0.044	0.327	0.044	0.014	0.014	0.212	0.10
4. Supply Side Advantage	0.206	0.022	0.006	0.046	0.404	0.295	0.023	0.004	0.13

Growth Drivers	Govt. Initiatives	Strong Domestic Demand	Rising Export Opportunities	Supply Side Advantage	Market Potential	Global Outsourcing Hub	Supply Chain Infrastructure	Contract Farming	Average
5. Market Potential	0.26	0.022	0.044	0.005	0.044	0.295	0.501	0.212	0.18
6. Global Outsourcing Hub	0.144	0.067	0.134	0.006	0.006	0.042	0.010	0.165	0.07
7. Supply Chain Infrastructure	0.206	0.013	0.22	0.140	0.134	0.295	0.071	0.165	0.16
8.Contract Farming	0.003	0.34	0.22	0.233	0.224	0.005	0.010	0.023	0.13

The relative table revealed the average value and the percentage share of each growth driver in the future growth potential of food processing industry. Relative table shows that market potential has the highest importance is followed by the Supply Chain Infrastructure and after that Strong Domestic Demand in the future growth of food processing industry.

**Relative Table (Table 7.3)**

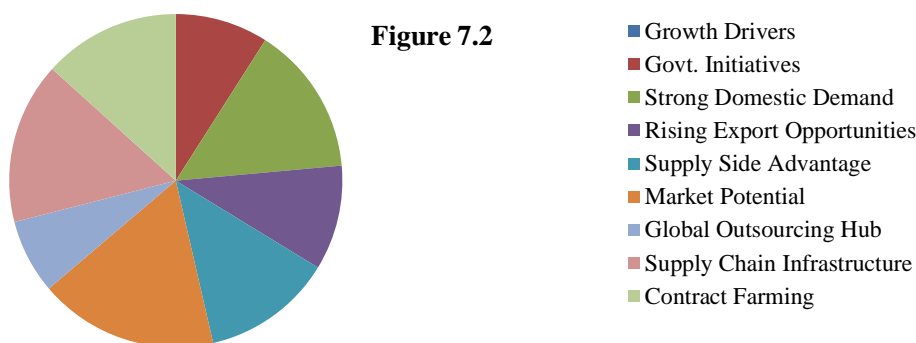
Growth Drivers	Average	Percentage (%)
1. Govt. Initiatives	0.09	9%
2. Strong Domestic Demand	0.14	14%
3. Rising Export Opportunities	0.10	10%
4. Supply Side Advantage	0.13	13%
5. Market Potential	0.18	18%
6. Global Outsourcing Hub	0.07	7%
7. Supply Chain Infrastructure	0.16	16%
8.Contract Farming	0.13	13%



In the AHP methodology, the fig 7.1 & fig 7.2 showed that market potential was found to be the most important growth driver for growth of food processing industry with the overall percentage of 18 as presented in Table supply chain infrastructure, strong domestic demand, supply side advantage and contract farming followed with the percentage of 16, 14, 13 & 13 respectively.

**Cumulative Table (Table 7.4)**

Growth Drivers	Percentage (%)	Cumulative Values
1. Govt. Initiatives	9%	9%
2. Strong Domestic Demand	14%	23%
3. Rising Export Opportunities	10%	33%
4. Supply Side Advantage	13%	46%
5. Market Potential	18%	64%
6. Global Outsourcing Hub	7%	71%
7. Supply Chain Infrastructure	16%	87%
8.Contract Farming	13%	100%



Results indicate the growth of food processing industry in India is significantly affected by market potential, supply chain infrastructure and strong domestic demand, but other key factors presented in this study cannot be ignored as they collectively contribute towards the development of food processing industry.

**CONCLUSION:**

The paper has contributed to the field by applying Analytic Hierarchy Process in the food processing industry. Although AHP is not the only best method for solving complex decision making problems, it is recognized as a tool to provide reasonable solution. The AHP was used as a basis to formalize the appraisal of growth drivers. In this study, growth factors are studied through the analytic hierarchy process (AHP) approach which allows both multi-criteria and simultaneous evaluation.

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