MOFPI
खाद्य प्रसंस्करण उद्योग मंत्रालय
Ministry of Food Processing Industries

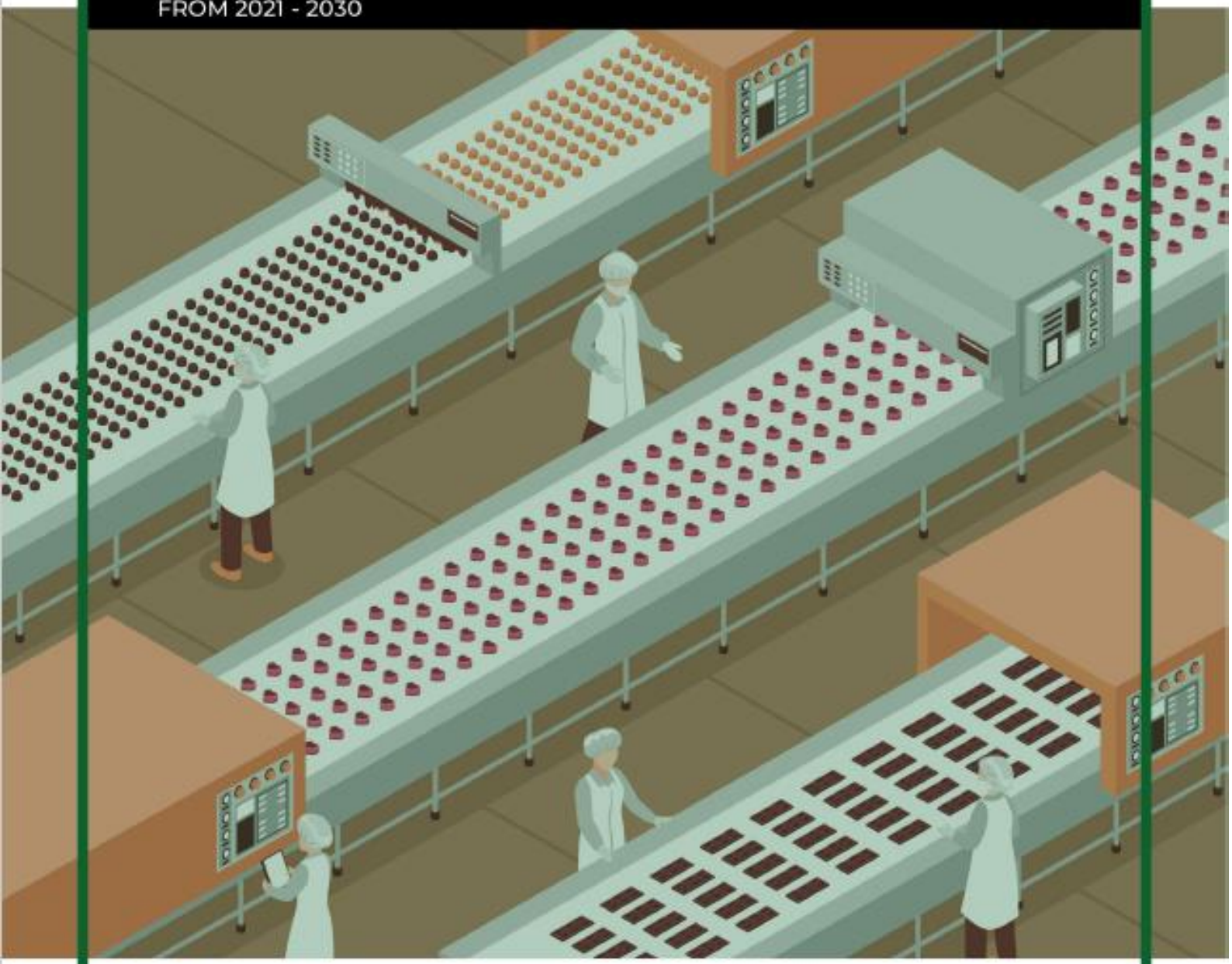
Study to Assess

HUMAN RESOURCE & SKILL REQUIREMENT IN Indian Food Processing Sector

Focus only on 11 Sub Sectors of Interest

Detailed Final Report

FROM 2021 - 2030



Feedback

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Abbreviations

Acronym	
AcSIR	Academy of Scientific and Innovative Research
AFD	Accelerated Freeze-Drying
AI	Artificial intelligence
AIBTM	Assocom Institute of Bakery Technology & Management
AIFPA	All India Food Processors' Association
AOM	Association of Operative Millers, Kansas, US
APEDA	Agricultural and Processed Food Products Export Development Authority
APMC	Agricultural Produce Market Committee
ASI	Annual Survey of Industries
B2B	Business to Business
B2C	Business to Consumer
BCC	Broiler Coordination Committee
BMC	Bulk Milk Coolers
Bn	Billion
BOP	Balance of Payments
CAD	Current Account Deficit
CAGR	Compound Annual Growth Rate
CAM	Computer Aided Manufacturing
CAPEX	Capital expenditures
CC	Collection Centers
CFTRI	Central Food Technological Research Institute
CIAE	Central Institute of Agricultural Engineering
CIFT	Central Institute of Fisheries Technology
CII	Confederation of Indian Industry
CLFMA	Compound Livestock Feed Manufacturers Association
CMIE	Centre for Monitoring Indian Economy
COVID 19	Coronavirus disease of 2019
CPC	Central Processing Centre
CPI	Consumer Price Index
Cr	Crore
CRM	Customer Relationship Management
CSMT	Choyal School of Milling Technology
CSO	Central Statistics Organisation
DAHD	Department of Animal Husbandry & Dairying
DC – MSME	Development Commissioner Ministry of Micro, Small & Medium Enterprises
DEDS	Dairy Entrepreneurship Development Scheme
DGM	Deputy General Manager
DIDF	Dairy Processing and Infrastructure Development Fund

Acronym	
EDP	Electronic Data Processing
ERP	Enterprise Resource Planning
EU	European Union
EXIM	Export-Import
Expn.	Expansion
F&B	Food & Beverage
F&V	Fruit and Vegetable
FACE	Food & Agriculture Centre of Excellence
FBO	Food Business Operators
FCI	Food Corporation of India
FDI	Foreign Direct Investment
Fedn	Federation
FEFO	First Expiry, First Out
FGD	Focus Group Discussion
FICSI	Food Industry Capacity & Skill Initiative
FMCG	Fast-moving consumer goods
FOB	Free on Board
FoSTac	FSSAI-Food Safety Training & Certification
FP	Food Processing
FPC	Farmer Producer Company
FPO	Farmer producer organizations
FPSA	Food Processing Suppliers Association
FSSA	Food Safety and Standards Act
FSSAI	Food Safety and Standards Authority of India
FSSR	Food Safety and Standards Regulations
FY	Financial Year
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
Gms	Grams
GST	Goods and Service Tax
GVA	Gross Value Added
HACCP	Hazard Analysis and Critical Control Point
HMI	Human-Machine Interface
HORECA	Hotel, Restaurant and Cafe
ICAR	Indian Council of Agricultural Research
ICMR	Indian Council of Medical Research
IDMC	Indian Dairy Machinery Company Ltd
IIOT	Industrial internet of things
IMF	India and International Monetary Fund

Acronym	
INAPH	Information Network for Animal Productivity and Health
INFAH	Indian National Federation of Animal Health
INR	Indian Rupee
IoT	Internet of Things
IQF	Individually Quick Frozen
ISO	International Organization for Standardization
IT	Information Technology
ITI	Industrial Training Institute
Kg	Kilogram
L / Lac	Lakh
LLPD	Lakh Litres Per Day
LMS	Large Medium Small
MATS	Microwave Assisted Thermal Sterilization
MEIS	Merchandise Exports from India Scheme
MES	Manufacturing Execution System
MFP	Mega Food Park
MIDC	Maharashtra Industrial Development Corporation
MMT	Million Metric Tonnes
Mn	Million
MoFPI	Ministry of Food Processing Industries
MoU	Memorandum of Understanding
MPEDA	Marine Products Export Development Authority
MSME	Ministry of Micro, Small and Medium Enterprises
MSPI	Ministry of Statistics and Programme Implementation
MT	Metric Tonne
MTPD	Metric Tonnes Per Day
NABARD	National Bank For Agriculture And Rural Development
NCR	National Capital Region
NCT	National Capital Territory
NDDB	National Dairy Development Board
NDP	National Dairy Plan
NDRI	National Dairy Research Institute
NECC	National Egg Coordination Committee
NG	Natural Gas
NIC	National Informatics Centre
NLRP	National Level Resource Person
NOS	National Occupational Standards
NPA	Non-Performing Asset
NPDD	National Programme for Dairy Development
NRDC	National Research and Development Center

Acronym	
NSDC	National Skill Development Corporation
NSQF	National Skills Qualifications Framework
NSSO	National Sample Survey Office
PCM	Phase Change Material
PFI	Poultry Federation of India
PG	Postgraduate
PLC	Programmable Logic Controller
PLI	Production Linked Incentive
PLISFPI	Production Linked Incentive Scheme for Food Processing Industry
PLM	Product lifecycle management
PM-FME	Prime Minister Formalization of Micro Food Processing Enterprises
PMGEP	Prime Minister Employment Generation Program
PMI	Purchasing Managers Index
PMKSY	Pradhan Mantri Kisan Sampada Yojana
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
PUFA	Polyunsaturated Fatty Acids
QC	Quality Control
QP/NOS	Qualification Pack and National Occupational Standards
QSRs	Quick Service Restaurants
R&D	Research and Development
RBI	Reserve Bank of India
RC	Regional Centre
RFID	Radio Frequency Identification
RO	Regional Office
RTC	Ready to Cook
RTD	Ready to Drink
RTE	Ready to Eat
SAARC	South Asian Association for Regional Cooperation
SAMPADA	Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters
SC	Scheduled Caste
SCADA	Supervisory Control and Data Acquisition
SEA	Solvent Extractors' Association of India
SEAI	Seafood Exporters Association of India
SEZ	Special Economic Zone
SIA	State Implementing Agencies
SME	Small and Medium Enterprises
SMEs	Subject Matter Experts
SMP	Skimmed Milk Powder
SOPA	Soybean Processors Association of India
SRO	Sub Regional Office

Acronym	
t/ha	Tonne per Hectare
TBO	Tree Borne Oilseeds
TCI	Transport Corporation of India
TLPD	Thousand Litres Per Day
TOP	Tomato, Onion and Potato
TOTAL	All fruits and vegetables
UG	Undergraduate
UHT	Ultra-heat treatment
UK	United Kingdom
UP	Uttar Pradesh
USAID	United States Agency for International Development
USD	United States Dollars
USFDA	The United States Food and Drug Administration
UT	Union Territory
YoY	Year-on- Year

About the Document

Ministry of Food Processing Industries engaged Feedback Business Consulting Services Pvt. Ltd. (Feedback Consulting) for conducting a Study to assess Human Resource and Skill Requirement in the Food Processing Sector from 2021- 2030. The Final Report is being submitted to the Ministry which presents the detailed findings and provides estimates of overall food processing and employment across 11 sub sectors from various categories/ commodities in India.

This Report contains an Executive summary and 24 Chapters apart from the Annexures.

- **Executive Summary**

  A summary of the key findings starting with the Study Background, Objectives and Scope, Approach and Methodology, Limitations and Assumptions, the overall summary of findings, and the final recommendations

- **Chapter 1: Background, Objectives and Deliverables**

  Brief introduction to the assignment consisting of the Background of the project and highlighting the Objectives and high-level deliverables of the assignment

- **Chapter 2: Scope, Data Sources and Limitations of the study**

  Detailed scope of the study along with the deliverables, data sources used, and the limitations and assumptions used in the study

- **Chapter 3: Approach and Methodology**

  Details out the approach and methodology for the assignment, covering the High-level framework and the study execution framework. The section also sets out methodology used to arrive the sample design and the actual overall sample of primary interviews and FGDs conducted for the study. We have also provided a list of the Subject Matter Experts (SMEs) who were appointed as in- house experts for every sector. Details of the overall methodology used to arrive at the current employment, the framework used to derive the future employment across all the 11 sub sectors and the recommendation framework is included in this section

- **Chapter 4: Overview of the India Economy**

  Details out the overview of the Economy with details on the trends of the overall GVA growth, FDI inflow and export trends

- **Chapter 5: Overview of the India Food Processing Industry**

  Details out the past trends and current market size of the Indian Food processing industry, key government initiatives for the sector and the future growth drivers. We have also provided details on the past trends on the labor employed in the Food Processing sector and the impact of Covid on the sector.

- **Chapter 6 – 16: Sub Sector Analysis (for 11 individual sectors of interest)**

  Details are set out in 3 sub sections – First section sets out the overall business overview, value chain and stakeholders, key manufacturing clusters, past and current market trends, and the past and current export trends.

  Next section is on the overall employment scenario – past trends, current employment estimates and the relevant break up category of personnel, NSQF levels and by key clusters / states within India. We have also set out the details on the key job roles, the responsibilities and the skill

required to perform the job role. The section also covers details on the recruitment and training practices in the industry and the current skill gaps and challenges faced by the industry

The last sub section details out the future employment and skills sets. This section has details on the current and upcoming projects in the sector, the level of automation and based on the analysis an estimate on the employment additions from FY'20 to FY'30 and the relevant break up by category, by NSQF level and expected additions across various clusters in India. We have also set out the Emerging Prominent Job Roles in each sector along with the key activities and knowledge required.

- **Chapter 17: Skills Needs for unregistered units that can be considered for the PMFME scheme**

  The focus of the study was not specific to the unregistered segment, however based on the inputs from the industry and the experts, the section lists the key job roles for the unregistered units that can be considered for the PMFME scheme

- **Chapter 18: Employment Generation Potential Summary**

  The section sets out the data sources and the estimates we have used for the overall universe estimation for each sub sector, the overall processing volumes, the overall investments, and employment generation potential between FY'20 – FY'30

- **Chapter 19: Impact of Industry 4.0 Food Processing sector and the skills**

  The section sets out the details on the current levels of automation by sub sector, factors considered for automation and the skill enhancements required for Industry 4.0 in the Food Processing Industry

- **Chapter 20: Packaging trends in the Food Processing sector and impact on skills**

  The section sets out the details on current packaging trends, factors driving these trends and the skill gaps that need to be addressed to meet the standards of packaging in the food processing industry

- **Chapter 21: Outlook on the Food Fortification**

  The section sets out the details on the overview Food Fortification, the impact on skills and additional skill set required in the industry

- **Chapter 22: Expectations of Training institutes on Training Infrastructure**

  The section sets out the details on current Formal and In-formal training infrastructure and the industry expectations

- **Chapter 23: Recommendations on the Rationalization of the Current QPs**

  The section sets out the details on our recommendations on the rationalization of the 49 NSQF aligned QPs offered by FICSI, which over 9 sub sectors of Food Processing Industries

- **Chapter 24: Recommendations to MoFPI**

  The section sets out the 10-year action plan outlining the approach to mitigate the skill gap and development of relevant skillsets for the future including effective ways of undertaking skilling activities with public and private sector involvement

Executive Summary

I. Background

1. India is the second-largest producer of food in the world[1]. Food Processing is considered as the sunrise sector in India. It is playing a pivotal role in India's economic growth due to its vital linkages and synergies that it promotes between the twin pillars of the economy, i.e., Agriculture and the Manufacturing Industry, and also in terms of its contribution to the Gross Domestic Product (GDP), employment and investment.

2. While agriculture provides the farm produce as inputs to the Food Processing Industry (FPI) in the sector, it is then value added by the FPI by applying the relevant technology in the manufacturing sector.

3. The FPI contributes 32% of the USD 380 billion valued food and grocery market in India and with a healthy growth rate of 8% since 2014, this industry remains as the fifth-largest industry in terms of production, consumption, exports, and potential growth.

4. During the last 5 years ending 2018-19, the FP sector has been growing at an Average Annual Growth Rate (AAGR) of around 10.00%, as compared to around 3.11% in Agriculture at 2011-12 prices. The sector constituted as much as 8.98% Gross Value Addition (GVA) in Manufacturing and 11.11% GVA in Agriculture 2018-19 at 2011-12 prices[3]. The sector has witnessed a **FDI equity inflow of US$ 4.18[2] billion** between April 2014 and March 2020[4].

5. In 2010-11, the total number of registered FPI units in India was 35,838[5]. As per the latest Annual Survey of Industries (ASI) for 2017-18, the total number of Registered FPI units was **40,160**, which engaged/employed 19.33 Lakh workers as against the total 156.14 Lakh persons engaged in the overall Registered industry segment. This constitutes 12.38% (at 3-digit of NIC classification) of the employment generated from the overall Registered industry.

6. However, the number of unregistered/unincorporated enterprises manufacturing food and beverages accounted for was **24.59 Lakh**[6], which supports employment to 51.11 Lakh workers[6] as against the total 360.41 Lakh workers from the overall unregistered industry. This constitutes 14.18% of the employment generated in the unregistered industry segment. **Therefore, the Indian FPI is one of the major employment-intensive segments.**

7. In addition, India's FPI has several potential growth drivers, which include –(i) abundant supply of raw materials to the food industry on account of India (ii) a huge consumer base in India with around 1.3 billion consumers, their changing lifestyle, tastes and preferences due to urbanization, and also the increased rate of out-of-home consumption offering a huge

[1] http://www.fao.org/india/fao-in-india/india-at-a-glance/en/
[2] MoFPI Annual Report 2020-21.
[3] National Accounts Division, Central Statistics Office & MoFPI's Annual Report 2020-21.
[4] http://www.fao.org/india/fao-in-india/india-at-a-glance/en/
[5] Annual Survey of Industries 2016-17.
[6] NSSO Report No. 582 (73/2.34/2) on Economic Characteristics of Unincorporated Non-Agricultural Enterprises (Excluding Construction) in India; NSSO 73rd Round (July 2015-June 2016).

demand for processed and branded food (iii) rise in disposable incomes (iv) changes in the gender composition of workforce (v) huge export and investment opportunities by virtue of India's proximity to key export destinations and India's greater integration with the global economy (vi) increasing penetration of organized food retail outlets offering a wide range of options to consumers, and (vi) proactive government policy and support.

8. Due to these growth drivers, India's FPI has seen significant growth and changes over the past few years and is likely to gain further momentum in its growth in the future as well, given the demographics and macro-economic situation in India. A strong and vibrant skilled work force would be a critical factor for ensuring a sustained growth of India's FPI.

9. Considering the on-ground reality relating to the shortage of skilled, semi-skilled and unskilled work force in India's FPI and its impact on competitiveness of the industry and the criticality of this issue, the Ministry commissioned a study in October 2020 to assess the Human Resource and Skill Requirement in the Indian Food Processing Sector from 2021-30. Based on the outcome of the RFP process, M/s Feedback Business Consulting Services Private Limited, Bangalore was assigned to conduct this study.

II. Objective & Scope of Study

10. Commissioning of the study by the Ministry was done with the core objective to understand the current manpower, the skill gaps and the estimated future demand of the workforce from 2021-30, and the policy initiatives required for the purpose of exploring the possible options in rendering a suitable intervention, wherever required, in further augmenting the growth and development of India's food processing sector as has been done by the Ministry over several years through several positive and proactive policies. In addition, the study was also needed in the context of the Scheme for Human Resources and Institution- Skill Development (SHRISD) that was operationalized by the Ministry under PMKSY w.e.f. 2017-2018 onwards.

11. The study was mandated to cover only 11 sub-sectors of Food Processing as they are considered as major sub-sectors in terms of their available production, huge scope for increasing their further processing level by virtue of the existing several growth drivers, shortage of skilled labour force in these sub-sectors, etc. The 11 sub-sectors identified are – i. Bread and Bakery products ii. Cold Chain (incl. logistics) iii. Dairy Products iv. Fish and Seafood processing v. Fruits & Vegetables processing vi. Meat & Poultry processing vii. Milling (Grains & Oilseeds) viii. Beverages (Tea & Coffee) ix. Ready-to-eat & Ready-to-cook products x. Soya processing and xi. Spices.

12. The major areas of the scope of work identified for the study are – (i) Sub-sector and state-wise industry and labour market growth trends in food processing, including impact of the COVID-19 pandemic on employment in the food industry (ii) State-wise, sub-sector-wise and segment-wise forecasting of the human resource and skill requirement during 2021-30, and (iii) the development of a strategic road map and a 10-year Action Plan outlining the approach to mitigate the skill gap and the development of relevant skill sets for the future.

III. Approach & Methodology Adopted

13. The methodology outlined through the process of RFP for this study comprised of Primary Survey and Secondary Research. The duration of completion of the study was for 6 months. However, due to the impact of the COVID-19 pandemic in India, it reached its completion in 8 months.

14. The approach and methodology agreed and adopted in the study involved a high-level framework containing efforts to understand the current state of the FPI, the potential elements of impact, future employment potential and the possible road. This framework was divided into 5 phases comprising – (i) desk research to collate all available data (ii) sample design and coverage to arrive at a universe data, sample plan, etc., (iii) primary research and interviews with experts, including views of industry visionaries, training institutes, government authorities (iv) analysis and insights from the collected samples, and (v) giving a strategic action plan and recommendations as an outcome of the study.

15. In order to get an accurate data on the overall universe (i.e., number of FP units) present in India, at first, all the available secondary information was gathered from multiple Government sources like ASI, NSSO, RBI, etc. The list of data sources used in this study are given in the report in Chapter 2, Section 2.2.

16. As the ASI data was available for only 7 sub-sectors of interest, it was used primarily to understand the overall universe data for these sub-sectors. However, as no ASI was available for the rest 4 sub-sectors, namely Beverages (Tea & Coffee), Spices, Soya and Cold chain, the universe data/estimate for these sub-sectors was arrived at on the basis of the available published data, including those published by the government, industry bodies/boards and associations.

17. As a result of the above exercise, the overall universe data taken into account for the 11 sub-sectors of interest of this study was 41,008, which is very close to the ASI data of registered FPI units in India (i.e. 40,160 Nos.) as per their report of 2017-18. The sub-sector-wise break-up of the universe data is delineated in Chapter 3, Section 2, of this report. It is pertinent to mention that the above universe data is of registered FPI units. The unregistered FPIs was not taken into consideration as it is not in the ambit of the study, and the estimation of unregistered FPIs in India requires another explicit and independent study on account of the non-availability of reliable data sources on such unregistered FPIs, involvement of multiple strategies in their estimation, etc.

18. From the above universe data of registered FP units, the different segments of each sub-sector as Large, Medium, Small and Micro was identified on the basis of the classification of industry as laid down in the MSME guidelines. The segment- and sector-wise key clusters in a district were identified after gathering information from government officials in the key district in a state, other stakeholders like companies operating in the clusters, visionaries, and subject matter experts.

19. Consequently, the overall sample size arrived at and finalized for the study was 4005, encompassing 3928 samples from Micro, Small and Medium and Large FP companies (i.e. Micro - 1896 + Medium & Small – 1933 + Large - 99), 65 responses from state /district industrial corporations, local food processing company associations and 12 responses from relevant government authorities, industry bodies such as FICCI, CII, AIFPA, FPSA and industry experts etc.

20. Of these, 3928 primary interviews were held with FPIs across key clusters and states in India. The sub-sector wise break-up of these primary interviews has been described in Chapter-3 section 3.3, of the report. In addition, 50 Focused Group Discussions (FDGs) with key representatives of 192 FP companies were also held to get more insights on the overall growth of the identified sub-sectors, future technologies, trends, and other key details for each sub-sector. Discussions with 15 Subject Matter Experts (SMEs) and more than 50 visionaries/leaders from the food industry are other important aspects of the approach & the methodology adopted in the study.

IV. Limitations and Assumptions

21. The study involved some limitations that it did not cover all the sub-sectors of FPIs, only registered FPI units as per the ASI data were taken into consideration, categorization of type/segments of FPIs as Large, Medium, Small and Micro was done based on the MSME guidelines, etc. for want of such categorization in the ASI data, and no indication was found in the ASI about the overall processing volume and employment by the above type/segments of FP units in the 11 sub-sectors of interest of the study.

22. Given these limitations, certain assumptions were made in the study, which included extrapolation of the universe (i.e., for the number of units) for the study from the ASI data of 2017-18, classification of these units based on the MSME guidelines, deriving ratio of the processing volume and the number of employees required through primary interviews, etc., The details in this regard are described in Chapter 2, section 2.3, of this report.

V. Findings - Summary

23. The sub-sector Bread and Bakery Products, with a current overall market of 3.675 MMT, 1,996 Registered FP units, 8% past growth rate (i.e., from FY 2015-2020), 1.35 Lakh employees (in FY 2020) and Rs. 2,433 Crores as the overall export value, is expected to witness its growth during 2021-30 with 8.75 MMT as the overall market, 9.1% growth and 3.21 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 1.86 Lakh.

24. The sub-sector Dairy Products, with a current overall market of 40.8 MMT, 2,374 Registered FP units, 9.8% past growth rate (i.e., from FY 2015-2020), 2.02 Lakh employees (in FY 2020) and Rs. 1,982 Crores as the overall export value, is expected to witness its growth during 2021-30 with 102 MMT as overall market, 9.6% growth and 4.75 Lakh of employees FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 2.73 Lakh.

25. The sub-sector Fish & Seafood Products, with a current overall market of 26,000 MT, 591 Registered FP units, 16.3% past growth rate (i.e., from FY 2015-2020), 0.94 Lakh employees (in FY 2020) and Rs. 46,663 Crores as the overall export value, is expected to witness its growth during 2021-30 with 101,000 MT as the overall market, 14.4% growth and 3.54 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 2.59 Lakh.

26. The sub-sector Fruits & Vegetable Processed Products, with a current overall market of 8.54 MMT, 1,426 Registered FP units, 7.6% past growth rate (i.e., from FY 2015-2020), 0.88 Lakh employees (in FY 2020) and USD 623.64 MN as the overall export value, is expected to witness

its growth during 2021-30 with 17.5 MMT as the overall market, 7.4% growth and 1.8 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 0.92 Lakh.

27. The sub-sector Meat & Poultry Processed Products, with a current overall market of 1.75 MMT, 210 Registered FP units, 7.8% past growth rate (i.e., from FY 2015-2020), 0.3 Lakh employees (in FY 2020) and Rs. 23,375 Crores as the overall export value, is expected to witness its growth during 2021-30 with 5.02 MMT as the overall market, 11.1% growth and 0.92 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 0.61 Lakh.
28. The sub-sector Milling Products, with a current overall market of 21.79 MMT, ~23,792 Registered FP units, 2.1% past growth rate (i.e., from FY 2015-2020), 4.82 Lakh employees (in FY 2020) and Rs. 2,369 Crores as the overall export value, is expected to witness its growth during 2021-30 with 28 MMT as the overall market, 2.6% growth and 6.05 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 1.23 Lakh.
29. The sub-sector Beverages (Tea & Coffee) Products, with a current overall market of 1.51 MMT, ~1,075 Registered FP units, 4% past growth rate (i.e., from FY 2015-2020), 1.05 Lakh employees (in FY 2020) and Rs. 8,736 Crores as the overall export value, is expected to witness its growth during 2021-30 with 2.45 MMT as the overall market, 4.9% growth and 1.69 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 0.64 Lakh.
30. The sub-sector RTE & RTC Products, with a current overall market of 135,000 MT, 716 Registered FP units, 15.1% past growth rate (i.e., from FY 2015-2020), 0.51 Lakh number of employees (in FY 2020) and Rs. 5,775 Crores as the overall export value, is expected to witness its growth during 2021-30 with 459,000 MT as the overall market, 13% growth and 1.59 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 1.08 Lakh.
31. The sub-sector Soya Processed Products, with a current overall market of 18.35 MMT, 165 Registered FP units, 4.8% past growth rate (i.e., from FY 2015-2020), 0.06 Lakh employees (in FY 2020) and Rs. 3,681 Crores as the overall export value, is expected to witness its growth during 2021-30 with 34 MMT as the overall market, 6.4% growth and 0.11 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 0.05 Lakh.
32. The sub-sector Spices Products, with a current overall market of 185,000 MT, 1,063 Registered FP units, 8.4% past growth rate (i.e., from FY 2015-2020), 0.40 Lakh employees (in FY 2020) and Rs. 14,638 Crores as the overall export value, is expected to witness its growth during 2021-30 with 620,000 MT as the overall market, 12.9% growth and 1.34 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 0.94 Lakh.
33. The sub-sector Cold Chain, with 7,600 Registered units, 3% past growth rate (i.e., from FY 2015-2020), 2.24 Lakh of employees (in FY 2020), is expected to witness its growth during 2021-30 of 9% growth and 2.96 Lakh employees in FP units in FY 2030. Thus, the net expected skilled human resource requirement in this sub-sector during 2021-30 would be around 0.71 Lakh.

34. These selected 11 sub-sectors put together have a net current overall market at approx. 96 MMT in FY'20. The overall processing volume is likely to increase at a CAGR of 7.5% to reach approximately 198 MMT by FY'30, and employment from 14.6 Lakh will grow to 28 Lakh employees by 2030. Thus, the net expected skilled human resource requirement in these 11 sub-sectors during 2021-30 would be around 13.4 Lakh.

35. As per date, FICSI has identified 49 approved job roles, but as per our discussion with the industry stakeholders and our survey, Feedback identified 78 job roles available for skilling in the FP industry. The growth of FPIs estimated for the 11 sub-sectors of the FP sector during 2021-30 would require an additional 14 new job roles for skilling in the areas of Industry 4.0, New product development, Food Fortification, Packaging & Food Testing labs, which are currently non-existing or at a very nascent stage.

36. Some of the key challenges identified in acquiring skilling in the 11 sub-sectors of FP include lack of knowledge of the basic Food and Hygiene practices, limited awareness and availability of finishing school/informal training institutes offering relevant programs, inadequate infrastructure facilities vis-à-vis the demand for a skilled labour force, lack of continuous learning programs among existing employees, higher hiring cost, employee attrition across all levels, etc.

37. It was felt during analysis that the impact of Industry 4.0/IOT/Automation, Packaging Trends and Food Fortification in the Food Processing sector and its impact on skilling will be the additional key factors that will impact the overall skill levels in the industry.

VI. Recommendations - Summary

38. Feedback recommends a 11-point action plan in the formal and informal training methods to mitigate the skill gap and development of relevant skillsets for the future. These also include effective ways of undertaking skilling activities with public and private sector involvement. These 11 action points have been divided into two parts – (i) Applicable to the overall FP Industry and (ii) Specific to Micro enterprises in the FP industry

i. Recommendations Applicable to Overall FP Industry

1. MOFPI needs to support creation of '**MOFPI Authorised Center from Training (MACT)**' in FP Hubs/clusters. Unlike large firms, MSME firms do not have any major training infrastructure or capabilities to train their employees and face the load of higher attrition levels. Our research has estimated a need for 120+ such centres in the FP Clusters/ Districts in India, which could be implemented in a phased manner over the next 10 years. MOFPI should design a 3-month Certified Training Programme (CTP) that should be made mandatory for all employees getting into the FP sector. MACT can be the perfect place to impart this course. The syllabus of these should include basic Food Safety & Hygienic practices, sub-sector-wise specific syllabus such as the manufacturing process of key equipment used, operations of these key equipment and cleaning and handling of raw materials etc. Development of the syllabus should be undertaken by FICSI by taking inputs from the industry veterans. Post completion of the Training Programme, the individual could be called as "MOFPI-Certified FP Skilled Worker".

2. **Skill-gap focus** for Large, & MSME firms - As per date, FICSI has identified 49 approved job roles, but based on our discussion with the industry, Feedback has identified 78

existing job roles in the industry and 14 additional emerging job roles (overall 92 job roles) - MOFPI through FICSI needs to create relevant vocational training programmes for these identified job roles for the additional 43 job roles.

3. **Development of Qualification Packs** – FICSI currently has 49 QPs. However, FICSI has affirmed to rationalize the QPs to 38. With the additionally identified 43 new job roles, FICSI needs to identify & develop QPs for each sub-sector once in 2–3 years to meet the emerging requirements.
4. **Industry Labour Portal** – Develop a trained workers portal (e.g., FPNaukri.com) at the earliest. All trained workers' database needs to be maintained at a district/cluster level. Need to work towards making this as a 'One-stop-shop' for FP labour/employees' recruitment for the industry.
5. The **Private Sector Industry** (specifically from the Equipment Suppliers) wishes to participate and aid MOFPI in enhancing the training needs to the FP industry. MOFPI should encourage this and needs to work with the **Industry in PPP mode** - MOFPI could collaborate with Food Processing Equipment companies and have a pool of resources and training programmes to address the Maintenance Training requirements in each sub-sector. Select large companies in each sub-sector could be evaluated for their existing resources – training methods/systems to be used for helping MSME firms in the given sub-sectors.
6. The Government of India (GoI) should fund prospective companies to implement **Industry 4.0** solutions and provide for the upskilling of employees. Certain incentives should be offered for small and medium enterprises who would like to implement IOT, automation and other Industry 4.0 solutions.
7. **Awareness Creation** - MOFPI/FICSI needs to invest in making the right awareness creation tools such as advertising in vernacular/local newspapers/sponsoring & participating in certain sector-specific events/seminars and exhibitions and especially, in states like Tamil Nadu, where regional television channels have an extremely high recall rate, even considering multimedia advertisements. Digital and social media tools could also be explored.
8. Food Processing in **Formal Education** – (i) In our formal education system, the Food Processing Sector should be recognized as a key contributor to the nation's economy and needs to be formally included in our education system. (ii) There is a need to introduce 10+3Y Diploma or 10+4Y graduation course specifically for the Food processing sector; with a 3-month mandatory "Certified Training Programme", such B.F.Pr. Graduates will be definitely "Employable" and can be productive on the job within 1 week of induction & orientation in the factory on the job.

ii. Recommendations Specific to Micro enterprises in the FP Industry

9. **Skill-gap Focus for Micro-enterprises, Start-ups, and Entrepreneurship Firms** - (i) From the 92 job roles identified earlier, not all the job roles will be applicable for micro enterprises as they are very small in size and may not have so many roles. There is a need to club certain roles as outlined in each Sector Chapters of this report to address the needs of the micro-enterprises. (ii) Apart from this, a specific training programme should be developed for the micro-enterprises in the areas of entrepreneurship development, and

essential functions of operations, marketing, bookkeeping, registration, FSSAI standards, Udyog Aadhar, GST Registration, general hygiene, etc.

10. **Development of Online/Smartphone-based Specific Training and Certification** programmes for the MSME & entrepreneurs in start-up units – the Indian Food Processing industry is widespread and has units across the country, and even in smaller towns. Formalized training, either by FICSI or any other agency, is limited to certain towns and cities only. An Online Training and Certification Programme can help in a widespread reach in a much shorter time.
11. There is a tremendous scope for upgradation in skilled manpower due to Industry 4.0. To make the small- and micro-enterprises **'IOT Ready' for the future**, it is important that the employees of these firms are trained in basic computer skills and the proprietor/decision-makers are trained in the importance and advantages of Industry 4.0.

Chapter 1: Background, Objectives and Deliverables

1.1 Study Background

Indian food processing industry has seen significant growth and changes over the past few years, driven by changing trends in markets, consumer segments, technology and regulations.

These trends, such as changing demographics, growing population and rapid urbanization are expected to continue in the future and, therefore, will shape the demand for value-added products and thus for food processing industry in India.

These positive developments however have also resulted in apprehension about the emerging skill shortages due to mismatch between the demand for specific skills and available supply. In fact, of late, shortage of skilled, semi-skilled and unskilled worker has emerged as a critical factor impacting the competitiveness of the Indian food processing industry.

During the last 5 years ending 2018-19, Food Processing sector has been growing at a Compound Annual Growth Rate (CAGR) of around 11.62%. Government of India has accorded high priority status to food industry with an objective to reduce inefficiencies resulting in wastages/ losses. The industry growth along with demand for quality standards and technology adoption in manufacturing are driving the need for fresh skilling and up-skilling in the sector.

As the industry advances, the demand for skilled manpower will increase phenomenally. Moreover, if the Indian food processing industry has to achieve the projected growth targets set and become globally competitive, the need to develop and train the human resource efficiently would be essential. India can harness all the opportunities present in the food processing sector only when its labour force is educated and skilled.

Considering the criticality of this issue, Ministry of Food Processing Industries, Government of India commissioned a study to analyse the current skill challenges and anticipate the current and future demand of workforce in the food industry for the period 2021 to 2030.

1.2 Objectives of the Study

This study was commissioned to ascertain the present and future availability of human resources, the present gaps in skill sets, the skills required and the policy initiatives required in this regard in the future for the 11 sub sectors of interest in the food processing industry. The study was for the period 2021-30. Article 2 of the RFP clearly stated the 11 sub sectors to be covered in the scope of this study, and the same is listed below -:

i. Bread and Bakery products
ii. Cold Chain (incl. logistics)
iii. Dairy Products
iv. Fish and Seafood processing
v. Fruits & Vegetables processing

vi. Meat & Poultry processing

vii. Milling (Grains & Oilseeds)

viii. Beverages (Tea & Coffee)

ix. Ready-to-eat & Ready-to-cook products

x. Soya processing

xi. Spices

1.3 Deliverables of the Study

Inception Report: Within seven days of the allocation of the project, Feedback submitted an inception report, detailing the plan of action which included overall approach, methodology, information areas to be collected, overall universe estimation and proposed sample, detailed analysis plan and timeline for conducting the project.

Monthly Progress Report: Subsequent to the inception report, four, monthly progress reports were submitted in the overall project timeline.

The first moth document had details on the overall universe and relevant break up for each of the 11 sub sectors of interest. The report also included the final sample plan by sub segment and state, final questionnaires, and discussion guides to be used for the study.

The next month's reports had detailed chapters on overall sample covered along with the plan for the forth coming months as well as updates from the focused group discussions with specific panels, which was conducted under the guidance of the subject matter experts. These reports also consisted of specific details of all the 11 sub sectors of interest like market overview, stakeholders, historic trends, exports, current market, future outlook, employment status etc.

The month 4 document also set out the activities to be carried out for final analysis and future employment estimations to be presented in the Draft Final report.

Draft Final Report: The draft final report covering all aspects of the study including the power point presentation along with the summary report was presented and submitted to MoFPI.

This report covers the entire journey of the study, starting from the objective, what methodology was adopted in estimating the universe, finalization of the sample, understanding current state of each of the 11 sub sectors, factors impacting the employment of each of the sub sectors, future employment potential and actionable recommendations for MoFPI to ensure adequate and multi-dimensional skilling of the relevant sub sectors.

Chapter 2: Scope, Data Sources and Limitations of the study

2.1 Scope of the study

There are 3 key scope areas as outlined below:

i. Industry & Labor Market Trends in Food Processing

ii. State-wise, Sub sector wise and NSQF level wise forecasting of the Human Resource and Skill Requirement over a period of 2021-30

iii. Strategic Roadmap and Action Plan

The final report constitutes of various chapters, covering the following details, in order:

A. Overview of the 11 sub sectors

i. Industry overview Market size, stakeholders, export details, key clusters, past trends, and future outlook of the sub sector

ii. Current processing levels, employment details and relevant break ups, recruitment & training practices, and sector analysis

iii. Challenges related to Skill Availability Vs Skill Gaps

iv. Future projection – Overall Sector and Employment and relevant break ups

v. Existing & Emerging Prominent Job Roles

vi. Skill Needs for the unregistered units that can be considered for the PMFME scheme

vii. Expectations from the Industry Stakeholders

B. Employment Generation Potential Summary

i. Establishing total no. of units, comprising of these 11 sub sectors

ii. Current processing volumes and investments required for the projected employment

iii. Employment generation potential between FY 2020 to FY 2030 by each sub sector and across states

C. Impact of Industry 4.0 on the Food Processing Sector and Skills

i. Current level of automation, spends and investment norms, by each of the sub sectors

ii. Adaptation of Industry 4.0 and its impact on each of the sub sectors

iii. Skill enhancement need of the overall industry

D. Packaging Trends in Food Processing Sector and impact on Skills

i. Current size of the packaging industry, for the Food processing industry and upcoming trends

ii. Key drivers for the upcoming trends, for specific sectors

iii. Current level of skill gaps in the industry, and recommendations to sustain the changing trends in packaging for all the sub sectors

E. An Outlook on Food Fortification

i. Definition and overview of food fortification across the 11 sub sectors

ii. Impact of food fortification in future employment generation

F. Expectations of Training Institutes on Training Infrastructure

i. Formal and In-formal training and the current infrastructure across both types

ii. Key expectations of the Food processing sector, from both these types of training formats

iii. Brief overview of the MSDE report on skill assessment & anticipation study (manufacturing sector)

G. Recommendations on the Rationalization of the Current QPs

i. Current levels, approach, and methodology for rationalizations across sub sector

ii. Final set of QPs that can be rationalized

H. Recommendations to MOFPI

i. Support system that needs to be created to enable the projected employment growth

ii. Skill gap focus for Large and MSMEs, Startups and Entrepreneurship firms across job roles, in all the 11 sub sectors

iii. Recommendation on QPs, need for manpower planning and working with Industry in the PPE Mode

iv. Creating formal training and road map towards doing this for each of the 11 sub sectors

2.2 Data Sources used for the Study

The list of Secondary sources used in the Study is given below:

Source	Data sets / information used
Annual Survey of Industries	No of Units in FPI, employment in FPI
MOFPI – Annual reports	Various inputs in many subjects
FSSAI	Employment, state wise units
RBI Economic Overview	Macro-Economic Information
Ministry of Statistics and Program Implementation, PLFS & NSSO	Various inputs on Economy, NSSO, etc.
Nabard – Napcons Report	Cold Chain information
National Center for Cold Chain Development (NCCD)	Cold Chain information
National Dairy Development Board	Statistics related to Dairy Sector

Source	Data sets / information used
Ministry of Commerce & Industry (Tradestat)	Exports Statistics
FICCI Paper on Development of Dairy Sector in India	Dairy Industry information
CMIE – CAPEX	New project investments
Projects Today	New project investments
Marine Products Exports Development Authority	Fisheries and Marine products industry information
Agricultural and Processed Food Products Export Development Authority (APEDA)	Various inputs across sub-sectors
Basic Animal Husbandry Statistics-2019	Statistics on Meat & Poultry industry
Indian Chamber of Food & Agriculture	Milling industry statistics
Tea Board of India & Coffee Board of India	Annual report for statistics on Tea and Coffee industry
Soya bean Processing Association	Information on Soyabean and Processing industry
Spices Board of India	Information on Spices industry in India
RBI KLEMS	Employment data reference for various industries

Table 1: List of Secondary sources used in the study

2.3 Limitations of the Study

Limitations of the study

- The study did not cover all the sub sectors of the Food processing industry, it categorically covered only 11 sub sectors as defined by MoFPI
- This study covered only the registered FPI units in these 11 sub-sectors and the base for these units was essentially the ASI data. No un-registered FPI units in these 11 sub-sectors were considered in this study
- ASI data gives the total number of the registered units and does not categorize these units by the type i.e., Large, Medium, Small or Micro enterprises
- ASI data does not give any indication on the overall processing volumes and the employment by type of units for the 11 sub-sectors covered for the study

Given these limitations, there were some assumptions that were considered and the same is listed below -:

Assumptions used in the study

- The universe (for number of units) arrived for FY 2019 – 20 for the study has been extrapolated from ASI data of the year 2017-2018 (based on the 10-year CAGR of these sub-sectors)
- The further classification of these units was done, based on the MSME guidelines

- The ratio of total processing volumes and number of employees required by type of units was derived from the analysis of the primary interviews and cross checked by SMEs
- Impact of automation is expected to be higher in Large firms, followed by Medium and Small and then Micro, in the next 10 years
- Break-up of the employment potential by NSQF levels, will be a function of impact of level of automation, new product development, changes in packaging, product sustainability, growing export markets, food fortification, regulatory environment, etc.

Chapter 3: Approach & Methodology

The study approach and methodology started by tapping into all the available secondary information from multiple government sources like ASI, NSSO, RBI, etc. to get accurate data on the overall universe numbers and the number of units present in the Food Processing Industry.

Post this, the study involved a large sample driven primary research exercise covering a variety of stakeholders. Along with this, Focus Group discussions and in-depth interviews & discussions were conducted with industry representatives, as well as visionaries. Feedback Consulting had also onboarded Subject Matter Experts (SMEs) who were involved through all the phases of the study. Feedback Consulting also utilized its frameworks for analysis and to get the key insights on the market, based on which Feedback proposed a future road map for the Ministry.

3.1 High Level Framework

The framework to assess the skill gap in the 11 sub-sectors of interest in food processing industry over the next 10 years is shown below in the chart:

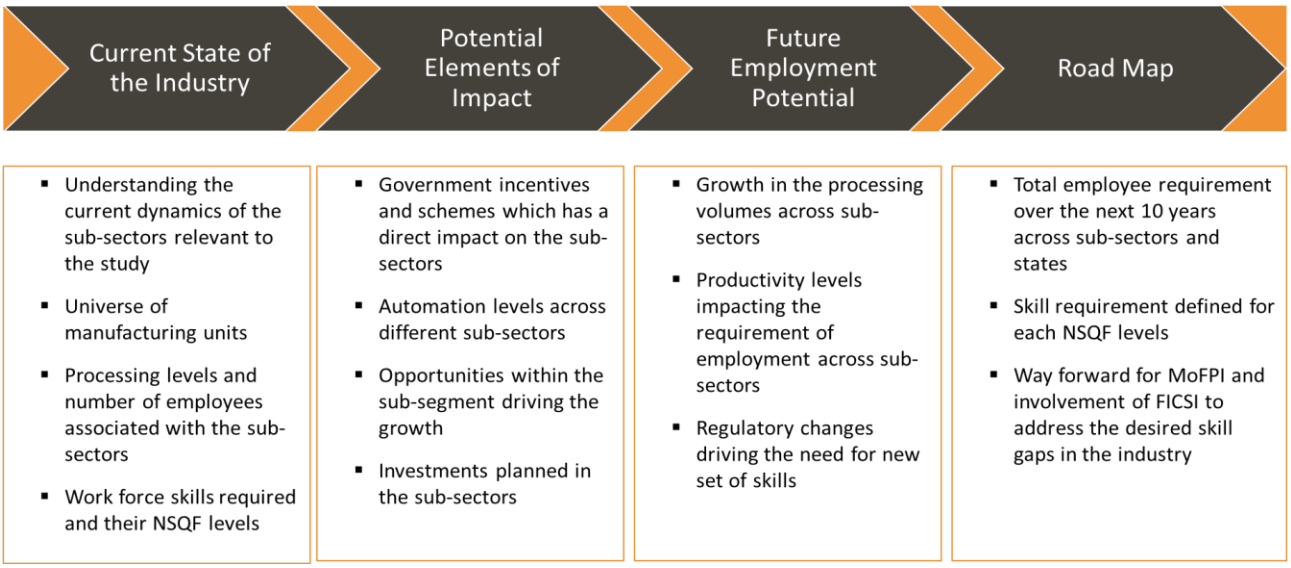


Figure 1: High Level Framework

3.2 Study Execution Framework

The study was divided into five phases. This is explained in the chart below

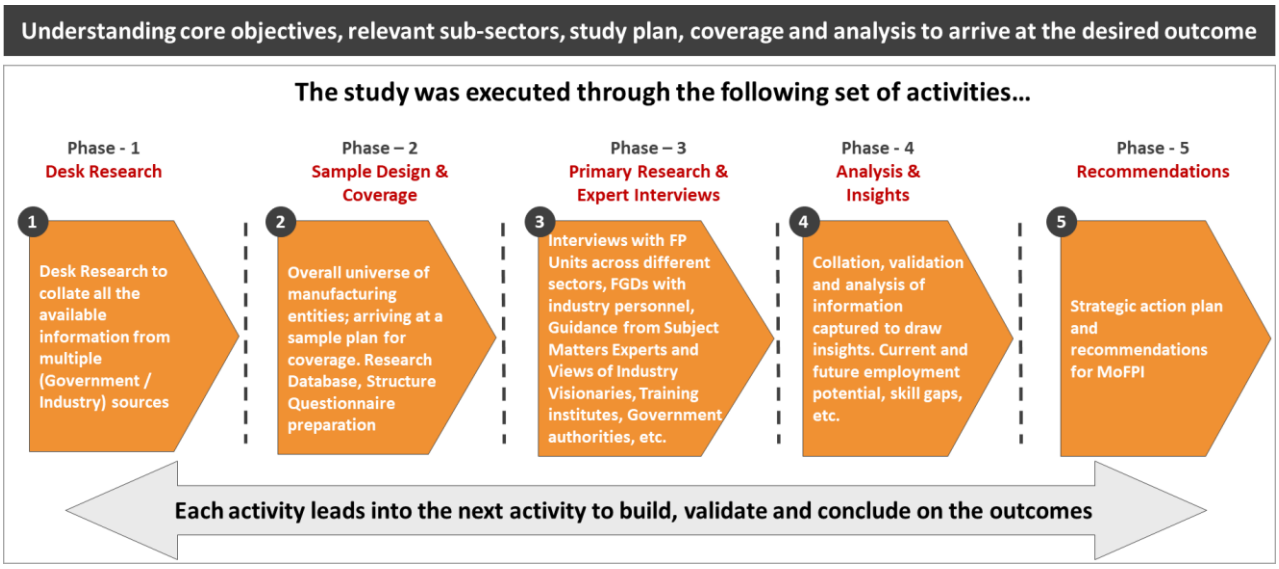


Figure 2: Study Execution Framework

The detailed activities in each phase have been listed below:

Phase 1: Desk Research

List of all the secondary data sources used for the desk research, is covered in Chapter 2, section 2.2.

- Details on the overall industry dynamics for all the sub sectors such as, industry size, historic growth rates, trends and current technologies used
- Details on the number of units present across the key food processing sectors, overall employment, and growth rates etc.
- Evaluated historic Food Processing sectors employment related information and reports published by the ministry as well as other sources available in the public domain.
- Conducted desk and primary discussion with State / District Industrial Corporations to prepare a state wise long list of FP clusters.
- Study of various macro-economic factors / Govt. initiatives and schemes / new technologies that would drive the growth of Food Processing sector in India over next 10 years.

Phase 2: Sample Design and Coverage

- ASI data was used to understand the overall universe data across the sub-sectors of interest; however, the data was available only for 7 of the 11 sub sectors of interest. For the rest of the 4 sectors, Feedback collected the universe estimates from relevant published Government sources, industry boards, and associations.

Overall Universe Estimates

Sub-sector	Overall Universe *(Total No. of units in India)*
Bread and Bakery products	1,996
Dairy products	2,374
Fish & seafood processing	591
Fruits & Vegetables processing	1,426
Meat & Poultry processing	210
Milling (Grains & Oilseeds)	23,792
Ready-to-eat & Ready-to-cook products	716
Cold Chain (incl. Cold Storages, Refer Trucks and Pack Houses)	7,600
Beverages (Tea & Coffee)	1,075
Spices	1,063
Soya processing	165
TOTAL	**41,008**

Table 2: Overall Universe Estimates

Source: ASI data and Feedback Analysis

- The chart below set outs the methodology on classifying the universe data and how the inputs were used to design the relevant sample to be covered for the study

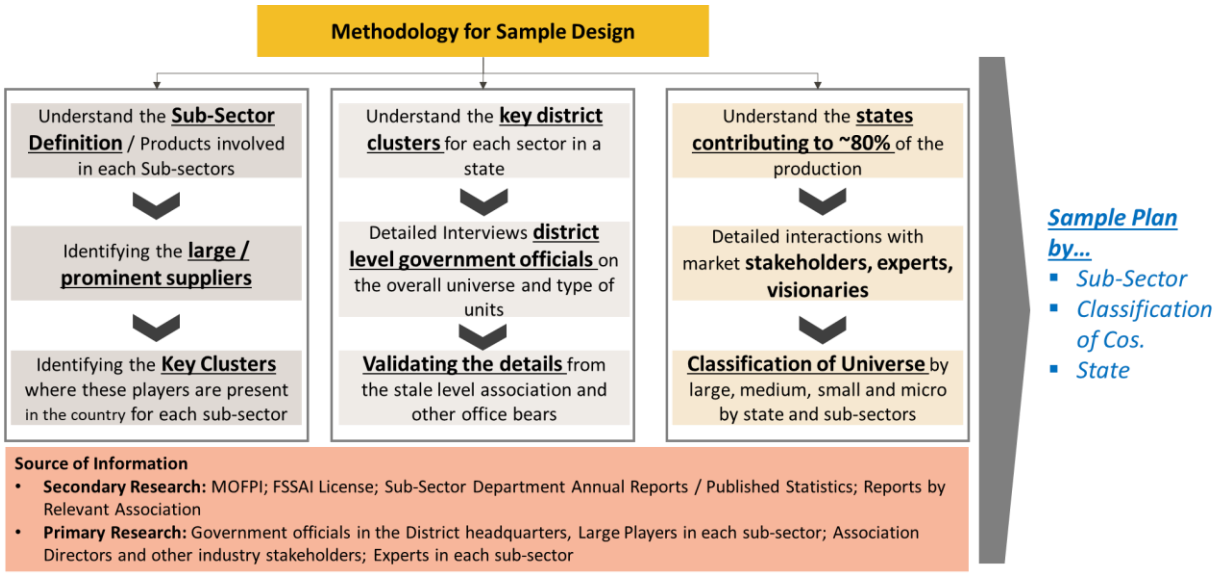


Figure 3: Methodology for Sample Design

- Feedback identified the key clusters for each segment and approached the government officials in key district to get a detailed understanding and further classification of the overall universe for each sector within the district.
- Feedback also used the views of the other stakeholders like companies operating in cluster, visionaries, and subject matter experts to validate the estimates
- All the data sources were put together and Feedback used the Probability Proportional to Size (PPS) sampling approach, a statistically significant and relevant methodology to arrive at sample numbers to be covered. This sample represented the universe and was used for all current and future employment estimations.
- The overall sample and the relevant break ups by state and type of companies arrived by using the above technique was discussed and approved by the MOFPI.

The split of this coverage is given in the Table below:

Respondent Category	Sample Size
Micro, Small & Medium and Large Food Processing Companies Micro Medium & Small Large	**3,928** 1,896 1,933 99
State / District Industrial Corporations, Local Food Processing Company Associations	**65**
Discussions with relevant Govt. authorities, Industry bodies such as FICCI, CII, AIFPA, FPSA and industry experts etc.	**12**
TOTAL	**4,005**

Table 3: *Overall Coverage: By Respondent category*

Phase 3: Primary Research & Expert Interviews

- Primary interviews conducted across key clusters to collect information related to employment in food processing sector
- Data collation, validation, processing, and analysis to arrive at meaningful insights
- Feedback followed a strict internal audit process, and the interviews were randomly backchecked (across sub-sectors and clusters) to validate the details collected. The interview was cancelled and replaced in case there were any deviations.

Phase 4: Analysis & Insights

- State wise, sub-sector wise, NSQF level wise employment estimation in FP sector in India and manpower availability.

- Review of existing qualification packs with FICSI and identification of rationalization required.
- Estimation of future employment potential between 2021 – 2030 by sub-sector, enterprise, NSQF level – including identification of emerging job roles across sub sectors

Phase 5: Recommendations

- Derivation of skill gaps, skilling required, NSQF level wise job roles with the required skills etc.
- Develop 10-year action plan and propose job roles, skill levels and skilling methodology for the sector.

3.3 Overall Coverage by sub sector

Feedback conducted 3,928 primary interviews with various manufacturing units across key clusters and states in India

Sub sector wise coverage is shown the table below:

Sub-sector	Coverage
Bread and Bakery products	412
Cold Chain (incl. logistics)	171
Dairy Products	415
Fish and seafood processing	404
Fruits & Vegetables processing	488
Meat & Poultry processing	104
Milling (Grains & Oilseeds)	621
Beverages (Tea & Coffee)	102
Ready-to-eat & Ready-to-cook products	740
Soya processing	91
Spices	380
TOTAL	**3,928**

Table 4: Overall Coverage: By Sub Sector

3.4 Focus Group Discussion

In addition to the primary interviews, Feedback also conducted 50 Focus Group Discussions (FGDs) in the study. The primary objective of these FGDs was to get more insights on the overall sub sectors, future technologies, trends, and other key details for each sub sector. Break up of which is represented is the table below:

FGD Type	No. of FGDs
FGDs with representative companies from the sub-sectors of interest	**35**
• Bread and Bakery Products	*4*
• Cold Chain (incl. logistics)	*2*
• Dairy Products	*4*
• Fish and Seafood processing	*3*
• Fruits & Vegetable processing	*5*
• Meat & Poultry processing	*2*
• Milling (Grain & Oilseeds)	*4*
• Beverages (Tea & Coffee)	*2*
• Ready-to-eat & Ready-to-cook products	*5*
• Soya processing	*2*
• Spices	*2*
FGDs with Food processing equipment manufacturers and technology (Industry 4.0, IOT, Factory Automation etc.) providers	**10**
FGDs with Colleges & Institutes, ITIs, Vocational Training Centres	**5**
TOTAL	**50**

Table 5: Focus Group Discussions (FGD): By Sub Sector

Overall, 192 companies have participated in the 50 FGDs conducted across sub-sectors. The distinguished panellists for these FGD panels were either of the following designated executives:

- **Food Processing Companies -** C-Level Executives / HR Head / Operations Head (Large companies), General Managers / Owner / Director / Operations Head (Medium), Owner / Director (Small & Micro)
- **Equipment Manufacturer** - C-Level Executives / Technology Head / Sales & Marketing Head
- **Training Institutes** - Curriculum Head / Head of the Department for Food Technology or Food Science Programs / Training Centre Head etc.

Following table indicates the list of FGDs by categorization of the FGD panels along with the list of companies participated.

#	Sub-Sector	Categorization of FGDs	Companies Participated
1	**Bread & Bakery**	**Industrial Bread** Manufacturers	• Modern Food Enterprises Private Limited (Modern Breads) • Moreish Foods Limited • Bonn Nutrients Pvt. Ltd.
2	**Bread & Bakery**	**Industrial Bakery** Manufacturers	• Parle Products

#	Sub-Sector	Categorization of FGDs	Companies Participated
			• Anmol Biscuits • Sarjena Foods (Baker Street) • Ravi foods Pvt. Ltd. (Dukes) • United Biscuits Pvt. Ltd (McVitie's)
3	**Bread & Bakery**	**MSME Bread & Bakery** Manufacturers	• Vell Biscuits • Nalanda Biscuits • Ajit Bakery • Kwality Confectioners and Bakers (India) Pvt. Ltd.
4	**Bread & Bakery**	**MSME Bread & Bakery** Manufacturers	• Veeramani Biscuit Inds. Ltd. • Biking Food Products Pvt. Ltd (Sumo) • Jahagirdar Foods
5	**Cold Chain**	**Cold Chain Solution** Providers	• Carrier Transicold • Anvira Solutions • Emerson Climate Technologies • Snowman Logistics
6	**Cold Chain**	Cold Chain - **Storage and Logistics / Transportation** Companies	• Frick India • Sheetal Parivahan • Coldman Logistics • JWL
7	**Dairy Products**	**Co-Op Federations and Large Dairy** Processing Units	• Jharkhand Dairy Coop Federation • The Bihar State Milk Co-Operative Federation Ltd. (COMFED) – Samstipur • Chanakya Dairy Products Limited • Tirumala Dairy • Umang Dairy
8	**Dairy Products**	**Mega Plants & Large Dairy** Processing Units	• Amul (Banas Dairy) • Nestle (Dairy Products) • Namaste India
9	**Dairy Products**	**MSME Dairy** Processing Units	• Aasma Food and Beverages • Adya Dairy • Dindigul Farm products Pvt Limited
10	**Dairy Products**	**MSME Dairy** Processing Units	• C.P. Milk & Food Products Pvt. Ltd. • Adarsh Dairy Udyog • Perfect Dairy Foods Private Ltd • Leela Krishna Dairy Private Ltd

#	Sub-Sector	Categorization of FGDs	Companies Participated
11	**Fish & Seafood Processing**	**Very Large & Large** Fish & Seafood Processing Units	• Abad Fisheries Pvt. Ltd. • DSF Group of Companies (Diamond Seafood) • Cambay Tiger • Devi Fisheries • Triveni Fisheries
12	**Fish & Seafood Processing**	**Large & Medium** Fish and Seafood Processing Units	• Baby Marine Ventures • Nekkanti Sea Foods Ltd. • Everest Sea Foods • Devi Seafoods • National Head – Seafood Exporters Association of India
13	**Fish & Seafood Processing**	**Small & Micro** Fish & Seafood Processing Units	• Goan Fresh • Sterling seafoods • PO Foods • Abbakaba Overseas / Orissa Seafood Exporters Association of India
14	**Fruits & Vegetable Processing**	**Large & Medium** F&V Processing Units	• Cremica Agro Foods • ADF Foods Ltd • Kraft Heinz India Private Limited • Tai Industries Limited
15	**Fruits & Vegetable Processing**	**Large & Medium** F&V Processing Units	• Mother Dairy • Saraf Foods • FieldFresh Foods • Freshtrop Fruits Ltd
16	**Fruits & Vegetable Processing**	**Medium & Small** F&V Processing Units	• Capricorn Food Products • Shimla Hills Offerings • Capital Foods (Ching's Secret, Smith & Jones)
17	**Fruits & Vegetable Processing**	**Small & Micro** F&V Processing Units	• Delicia Foods • Sahaj Foods & Agro Tech • Sil Food India Pvt Ltd • Mevive International Food Ingredients
18	**Fruits & Vegetable Processing**	**Small & Micro** F&V Processing Units	• Anand Food & Dairy Products (Haveat) • Vivan Foods Pvt. Ltd. (FRIC BERGEN) • Shamsons Foods • Little Bee Impex
19	**Meat & Poultry Processing**	**Meat** Processing Units	• Al-Sami Agro Products Pvt. Ltd. • Al-Hamd Agro Food

#	Sub-Sector	Categorization of FGDs	Companies Participated
			• Rustam Foods Pvt. Ltd. • Meat Product of India (Public Sector - Kerala)
20	**Meat & Poultry Processing**	**Poultry** Processing Units	• Suguna Foods Pvt. Ltd. • CPF (India) Pvt Ltd • Skylark Foods Pvt. Ltd. • Srinivasa Hatcheries Group
21	**Milling (Grains & Oilseeds)**	**Staples & Cereals Milling - Large** Organized Players	• ITC (Aashirvaad) • Poonam Roller Mills • Manickchand Roller Flour Mills • Sahoowala Grains
22	**Milling (Grains & Oilseeds)**	**Staples & Cereals Milling - Owner driven, MSME** Milling Units	• Mehrotra Consumer Products Pvt. Ltd. (Organic Tattva) • Shree Balaji Daal Mill • Khandesh Roller Flour Mills Private Limited • Shakti Flour Mill
23	**Milling (Grains & Oilseeds)**	**Oilseeds Milling - Large** Organized Players	• Adani Wilmar (Fortune) • Marico India (Saffola) • Agro Tech Foods Ltd (Sundrop) • Kaleesuwari Refinery Private Ltd (Gold Winner, Cardia Life, Orysa)
24	**Milling (Grains & Oilseeds)**	**Oilseeds Milling - Owner driven, MSME** Milling Units	• GEF India (Freedom Oil) • Gokul Refoils • Raj Oil Mills • Shree Uday Oil & Foods Industries & Others
25	**Beverages (Tea & Coffee)**	**Large & Medium** Tea & Coffee Processing Units	• Gujarat Tea Processors & Packers Ltd (Wagh Bakri brand) • AVT Natural Products Limited • Madhu Jayanti International • CCL Products (India) Ltd
26	**Beverages (Tea & Coffee)**	**Medium, Small & Micro** Tea & Coffee Processing Units	• Indus Coffee • Asia Tea Enterprises • Goodricke Tea • Starlon Naturals
27	**RTE / RTC Products**	**Large** RTE / RTC Manufacturers Focusing **Vegetarian** Foods	• ITC (Kitchens of India, Master Chef, Sunfeast) • MTR • Nestle

#	Sub-Sector	Categorization of FGDs	Companies Participated
28	**RTE / RTC Products**	**Other Large & Medium** RTE / RTC Manufacturers Focusing **Vegetarian** Foods	• Mother's Recipe (Desai Brothers) • Weikfield • Tasty Bites
29	**RTE / RTC Products**	**Medium, Small & Micro** RTE / RTC Manufacturers Focusing **Vegetarian** Foods	• Fazlani Exports Pvt. Ltd. • Himalaya foods • Vadilal Group • Om Oil & Flour Mills Ltd (Frozit)
30	**RTE / RTC Products**	**Medium, Small & Micro** RTE / RTC Manufacturers Focusing **Vegetarian** Foods	• Hiya Foods • Freshway Foods • Regal Kitchen Foods Limited • Nutririte Foods Private Limited
31	**RTE / RTC Products**	**Non-Vegetarian** RTE / RTC Manufacturers	• Innovative Foods Limited (Sumeru) • Nilon's • Gadre Marine Exports
32	**Soya Processing**	**Large & Medium** Soya Processing Units	• Patanjali Soya (Ruchi Soya) • Gujarat Ambuja Exports Ltd. • Adani Wilmar Ltd.
33	**Soya Processing**	**Small & Micro** Soya Processing Units	• Indian Soya Industries Pvt. Ltd. • Savour India Private Limited (Nutri) • Khaitan Agro (Khaitan Vegetable Oil)
34	**Spices**	**Large** Processing Units	• Swani Spice Mills • Akay Spices • Paras Spices • MTR Foods • Desai Brothers Ltd.
35	**Spices**	**MSME** Processing Units	• Krishna Dutta Spice • Goldiee Masala • Pravin Masalawale
36	**Equipment Manufacturers**	**Large MNC Equipment** Manufacturers Catering **across various Food Processing Sub-Sectors**	• Alfa Laval • Buhler India • Axtel
37	**Equipment Manufacturers**	MNC and Indian Companies Manufacturing **Fruits & Vegetable Processing Equipment**	• Jwala Techno Engineering Private Limited • Neologic Engineers • Rana Machines Pvt Ltd • Kala Biotech

#	Sub-Sector	Categorization of FGDs	Companies Participated
38	**Equipment Manufacturers**	MNC and Indian Companies Manufacturing **Bread and Bakery Equipment**	• Arun Rega • CS Aerotherm • Apple Bakery Machinery • Delight Engineering
39	**Equipment Manufacturers**	MNC and Indian Companies Manufacturing **Dairy Processing Equipment**	• IDMC Ltd • Bimal Industries • Goma Industries
40	**Equipment Manufacturers**	MNC and Indian Companies Manufacturing **Meat, Poultry, Fish and Seafood Processing Equipment**	• Kanchan Metals Pvt Ltd • RND AUTOMATION PVT. LTD. • Foodtech Equipment Company • Aarul Industries • Marel India
41	**Equipment Manufacturers**	Indian Companies Manufacturing **Beverages Equipment (Tea & Coffee Processing)**	• Mainland Engineering Pvt. Ltd. • Lakshmi Industrial Equipment • Shrinath Fabricators • Food And Biotech Engineers India Pvt. Ltd. • SSP Pvt. Ltd. • Marshall-Fowler Group
42	**Equipment Manufacturers**	MNC and Indian Companies Manufacturing **Milling Equipment**	• Suri Engineers • Pilot Smith India Pvt. Ltd. • Lark Engineering Co. (India) Pvt. Ltd
43	**Equipment Manufacturers**	MNC and Indian Companies offering **Packaging Solutions & Packaging Equipment**	• Paul Mueller India Packing Solutions (Paul Mueller Mekins JV) • Nichrome • Khosla Machines Pvt. Ltd • Krones India Pvt Ltd (Krones AG)
44	**Equipment Manufacturers**	MNC and Indian Companies Manufacturing **RTE & RTC Equipment**	• Economode Food Equipment • Harshad Food Equipment • Shrijeta Pack Tech
45	**Equipment Manufacturers**	Large MNC and Indian Companies offering **process automation & IoT solutions**	• Schneider Electric • Rockwell Automation • FANUC India Pvt Ltd • Yokogawa India Limited
46	**Training Institutes**	**Training Institutes** Offering **skill development**	• Nalanda Educational Society, Guntur

#	Sub-Sector	Categorization of FGDs	Companies Participated
		programs on Food Processing	• Darjeeling Tea Research & Management Association (POST GRADUATE DIPLOMA IN TEA) • JM Bakers Academy
47	**Training Institutes**	**Formal Education** Institutes offering **B. Tech in Food Technology or Food Processing**	• Indian Institute of Food Processing Technology (IIFPT) • Karunya University • College of Fish Nutrition and Food Technology, Chennai • University of Agricultural Science (Department of Food Science), Bangalore
48	**Training Institutes**	**Training Institutes** Offering **skill development programs** on Food Processing	• Aaruthal Foundation • Ekta Shakti Foundation • Empower Pragati Vocational & Staffing Pvt. Ltd. • Foresight Edutech Private Limited • Yashaswi Academy for Skills
49	**Training Institutes**	**Formal Education** Institutes offering **B. Sc in Food Technology or Food Processing**	• Mahatma Gandhi University (Kottayam) - BCM College • Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (College of Agriculture) • Calicut University, Calicut (DGM MES Mampad College) • M. S. Ramaiah University of Applied Sciences (MSRUAS)
50	**Training Institutes**	**Formal Education** Institutes offering **B. Tech in Food Technology or Food Processing**	• Jadavpur University • Tamil Nadu Agricultural University • MIT College of Food Technology, Pune

Table 6: FGDs: By categorization & list of companies who participated

3.5 Discussion with the Subject Matter Experts

Feedback Consulting also onboarded 15 Subject Matter Experts (SMEs) and these SMEs have been appointed as in-house Expert for the respective sub-sector.

Following points have been discussed with SMEs:

- Current state of the industry and Outlook
- Influence of Technology in the sub-sector

- Current Processing Levels and past trend
- Current challenges faced by the industry players
- Validating Employment details gathered from the primary interviews
- Validating the prominent job roles and associated Skill gaps for the prominent job roles
- Expected growth in processing levels, export etc. over next 10 years
- Infrastructure requirement for the future demand
- Impact of the technology – levels of automation, IOT, etc. on each sub sector
- Employment generation potential and views on new job roles likely to emerge over next 10 years.

SMEs also shared their inputs on the sub-sector, participated in the FGDs to ensure quality of discussions and shared their inputs during the recommendations stage of the study.

Sub-Sectors	Name of Subject Matter Experts	Total Years of Experience	Company / Freelance Consultants	Remarks
Bread and Bakery products	Mr. Rajkapoor	35+	Assocom India Pvt. Ltd. Assocom Institute of Bakery Technology & Management (AIBTM)	Mr. Raj Kapoor is founder and Managing Director of Assocom India Pvt. Ltd and AIBTM in NCR Delhi. He has been consultant to USAID, United Nations World Food Programme. He is also national resource person of Food Safety Authority of India. He is editor monthly news magazines Wheat Update, Bakery Update, Food Update and Soya Update
Cold Chain (incl. logistics)	Mr. Manjunath	35+	Innovation In-Sight & Cold Chain Consulting	Subject Matter Specialist & Advisor on Cold Chain, Business Creation & Innovation
Dairy Products	Mr. G C Das	40+	Freelance Consultant (Dairy & Food Processing)	Mr. Das has experience in consulting MoFPI, National Productivity Council, Department of Animal Husbandry & Dairying, etc. He also has working experience with Amul Dairy, Haryana Milk Foods, etc.
Fish and seafood processing	Mr. Jagdish Fofandi	25+	Seafood Exporters Association of India (SEAI)	National President of Seafood Exporters Association of India (SEAI). Also manage Deepmala Marine Exports which primarily focuses on exporting marine products located in Veraval, Gujarat.

Sub-Sectors	Name of Subject Matter Experts	Total Years of Experience	Company / Freelance Consultants	Remarks
Fruits & Vegetables processing	Mr. Sumeet Kumar Pandey	35+	Freelance Consultant (Food Processing)	Mr. Sumeet has experience in companies like Mother Dairy; DS Group; Britannia; Kissan Products and PRIMLAKS Group (Nigeria)
Meat & Poultry Processing	Dr. A K Rajput	40+	Executive Director - All India Poultry Breeders Association & DGM - Corporate Affairs - Suguna Poultry	40+ Years of experience, currently designated as Executive Director for All India Poultry Breeders Association and looking after all corporate affairs for Suguna Poultry Limited with various Ministries
Milling (Grains & Oilseeds)	Mr. Pankaj Moona	40+	Freelance Advisor	Nearly 40 years of experience in the Cereals & Staples, milling sector and, he was the Head of Staples in Adani Wilmar
Beverages (Tea & Coffee)	Mr. Kaushik Bhattacharjee	35+	Darjeeling Tea Research & Management Association	Operating training institute that offers post graduate diploma program on tea management in Darjeeling
Ready-to-eat & Ready-to-cook products	Mr. Ramnath Suryawanshi	36+	Global Foodtech Consultants	Mr. Suryawanshi is the founder and CEO of his venture Global Foodtech Consultants working with various companies / projects in India, Middle East, and global market. He is also a FoSTac Training Partner and NLRP FoSTaC. (FSSAI-Food Safety Training & Certification)
Soya processing	Mr. K J Sreeraj / Mr. Siva Kumar	30+	Sakthi Soya (Sakthi Group)	Mr. K.J. Sreeraj has around 30 years of experience and he is currently associated with Sakthi Group for their Soya Division as Vice President for Marketing. He has prior experience in companies like Heinz India, etc. Mr. Siva Kumar is General Manager – Operations for Soya division in Sakthi Group.
Spices	Mr. Jainendran	27+	Eten Craft Holdings Pvt Ltd	Director in Eten Craft focusing on design and implementation of sustainability management framework, BPR and development of new business for Spices, Fruits & Vegetables

Sub-Sectors	Name of Subject Matter Experts	Total Years of Experience	Company / Freelance Consultants	Remarks
Equipment / Technology	Mr. M. Dhinagar Vel	40+	INDIANFOODS Innovations Ⓟ Ltd (IFIPL) PIPIP - Pioneers in Proven Innovative Projects & WP-Haton India Sales & Service Centre	Founder and Managing Director for Indian Foods Innovations Pvt. Ltd and representing WP-Haton in India through sales and service centre
Training Institutes	Mr. Joseph Lawrence Savarimuthu	40+	JM Bakers Academy	Mr. Lawrence is a consultant across various food processing sub-sectors. He also works with the Government for skill development in NE States. Also, Lecturer in CFTRI, Certified German Baker and runs an academy in Coimbatore
	Dr. Prabashanker	32+	International School of Milling & Baking Technology, CFTRI, Mysore	Dr. Prabashanker is a Sr. Principal Scientist for Flour Milling Baking and Confectionery Technology Department. Also, an Associate Professor in Academy of Scientific and Innovative Research (AcSIR)

Table 7: List of Subject Matter Experts (SMEs) : By Sub Sector

3.6 Discussion with Visionaries

Apart from the subject matter experts, Feedback Consulting had also conducted discussion with various Visionaries / Industry leaders - more than 50 Visionaries / Industry Leaders were identified to get their long-term vision for their respective sub-sectors.

3.7 Current and Future Employment Methodology for the 11 sub-sectors of interest

a. Methodology for establishing current employment in 11 sub-sectors of FPI in India

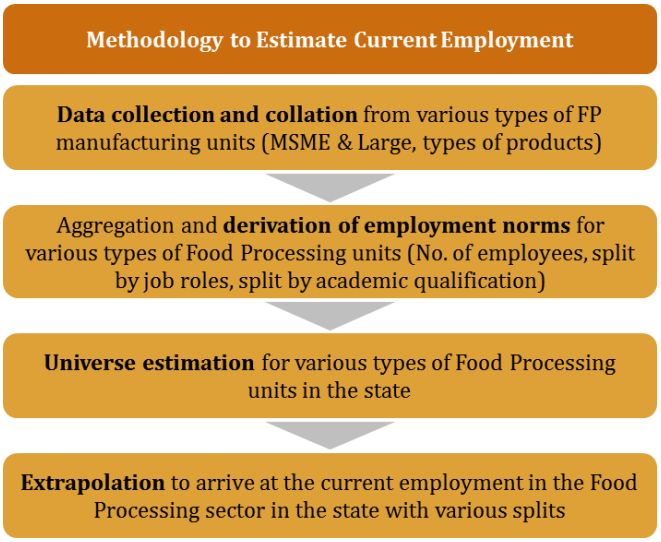


Figure 4: Methodology for Establishing Current Employment in 11 sub-sectors of FPI in India

b. Methodology for establishing future of 11 sub – sectors of FPI in India

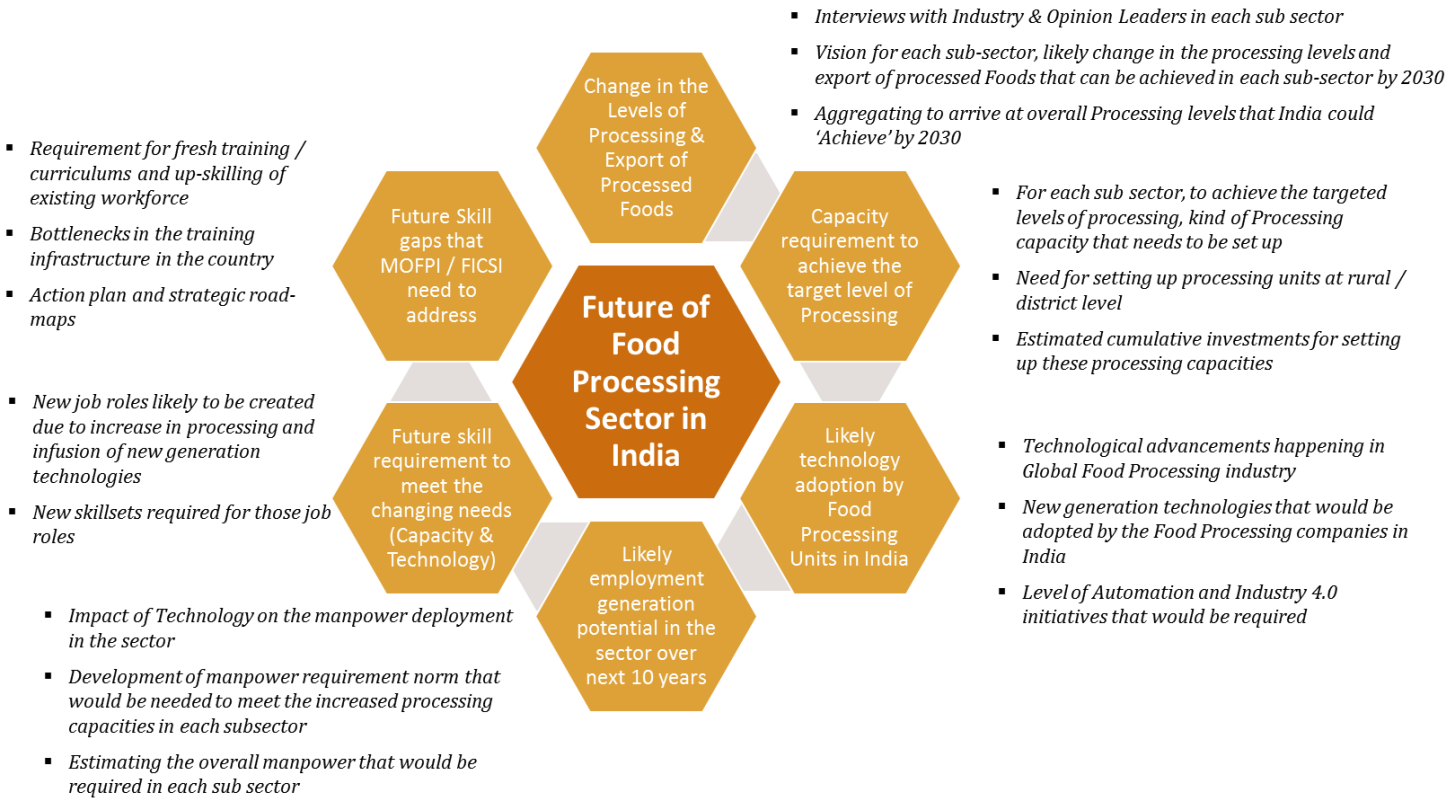


Figure 5: Methodology for establishing future of 11 sub – sectors of FPI in India

After setting out these key dynamics, the same was used to estimate the employment generation in the sub-sector over next 10 years. While there would be requirement of additional manpower

due to increase in processing capacity, infusion of technology may have a negative impact on the manpower requirement. Impact of these two contradicting forces were analysed during estimation of employment potential in the sub-sector.

Along with these steps, Feedback had conducted Focus Group Discussions with Industry Owners, Directors, Institutes, and Opinion makers etc. to understand the existing skill gaps in each sub-sector and need for skill development. Based on these findings, necessary recommendations will be made to MOFPI / FICSI.

c. Methodology for estimating future employment potential by state

The future estimates for potential employment creation by state has been derived by considering multiple variables that impacts the state and the employability potential across segments within the state. The approach adopted was a two-step process:

- The first step was to establish the overall rate of growth for each state over the next 10 years. The overall growth rate was arrived by considering factors such as rate of growth of GSDP for each state, trend in the number of factories, growth in the number of employee addition and expected investments. The historic data trend was considered for a period of 10 – 12 years which would balance the cyclic trend if any.
- Each of the variables considered were assigned a weightage to relate their dependency on the overall projected growth for the state. The final growth rate for the state was derived using the weighted average formula.
- The second step was then to include the specific segment and its factor of growth on each of the states. In this case the two important variables which were considered were the derived growth rate for the state from step 1 and expected growth rate for the segment over the next 10 years.
- Both these variables were assigned weightage with a higher dependency on segment's expected growth rate, which is a function of the growth in output and planned investments as compared to the growth rate for the state derived from step 1. The overall growth rate for each of the segments by each state is then established by using the weighted average formula.

Factors Considered for Recommendations

The recommendations were based on the analysis conducted. The analysis framework for the Recommendations is shown below in the chart:

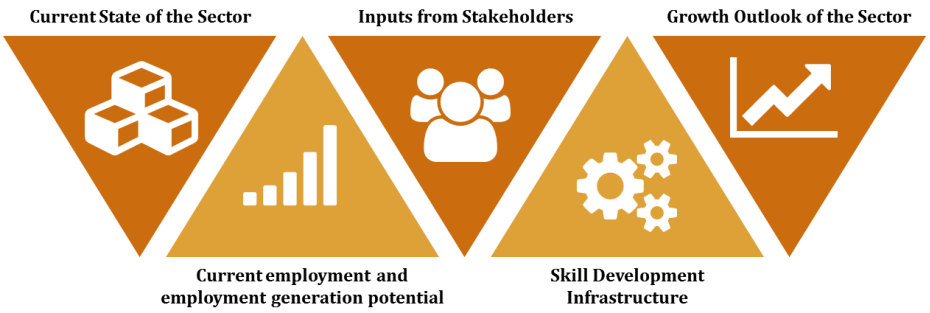


Figure 6: *Analysis framework for the Final Recommendations to MOFPI*

Chapter 4: Overview of the Indian Economy

With strong economic fundamentals, continued reform momentum, robust economic growth, strong fiscal consolidation, low current account deficit, higher agricultural output, growing FDI, low inflation and higher wages in rural areas, India has emerged as the fastest-growing major economy in the world according to the Central Statistics Organisation (CSO), India and International Monetary Fund (IMF). The Gross Domestic Product (GDP) at constant prices in the year FY 2019-20 grew by 4.2%, while the Gross Value Added (GVA) grew by 3.9% over the previous year[3] for the same period. The share of key sectors in total GVA is Services with 54%, Agri & Allied Sectors with 14% and Industry with 32%.

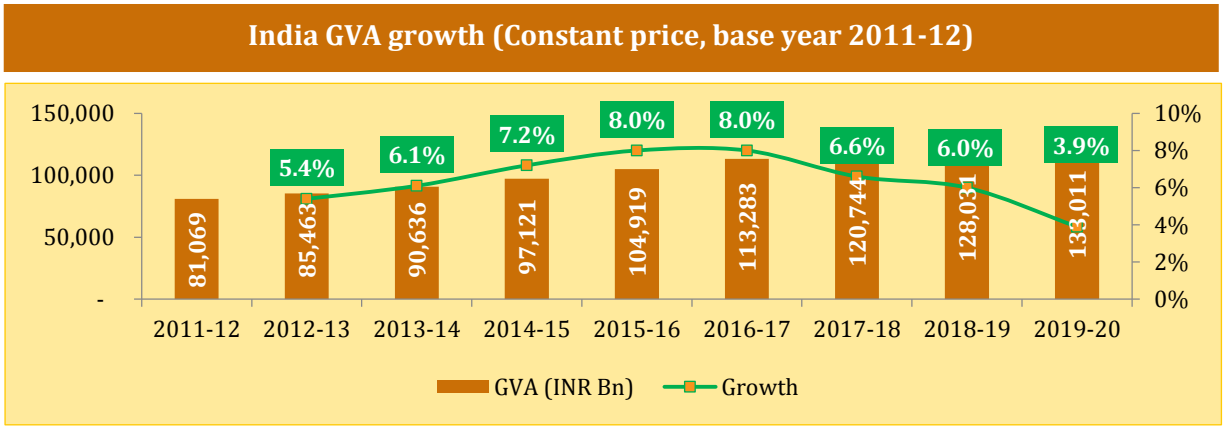


Figure 7: India GVA growth (INR Bn)

Source: GoI, Ministry of Statistics and Programme Implementation

India ranked 41 during FY 2019-20 in terms of the Global Competitiveness Index (GCI) prepared by World Economic Forum, and ranked 63 in Ease of Doing Business Index in the year 2020. This is also reflected in the increased FDI inflows in the country which has gone up by a CAGR of 16% over the last two decades as shown below:

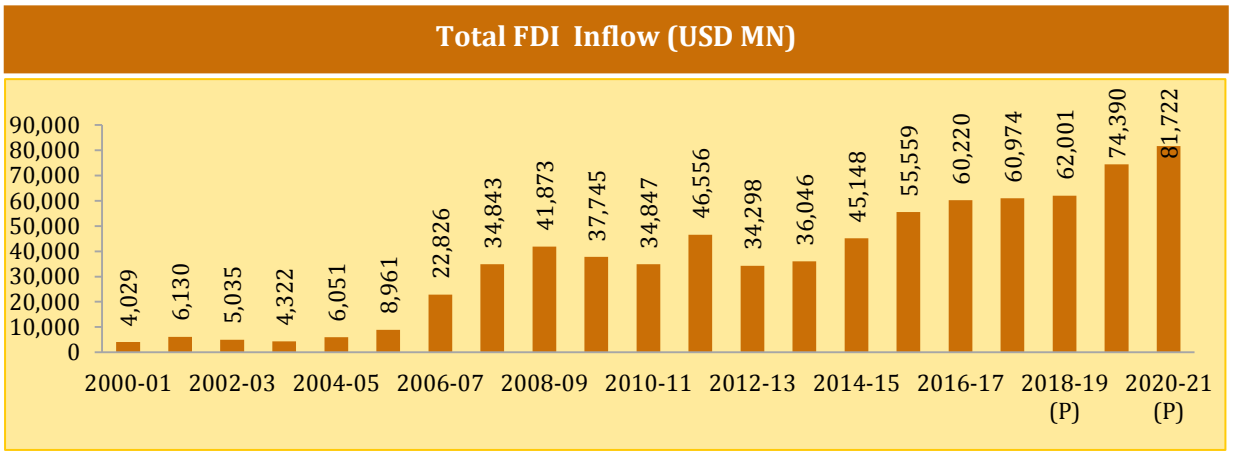


Figure 8: Total FDI Inflow (USD MN)

[3] RBI Economic Overview, MOFPI Annual Report

India has seen a rise of 10.5% CAGR in the overall Exports in the last two decades. The share of India's food export in the world was 2.27% in 2019 and the share of India's food imports in the world was 1.27% in 2019. India's food trade.

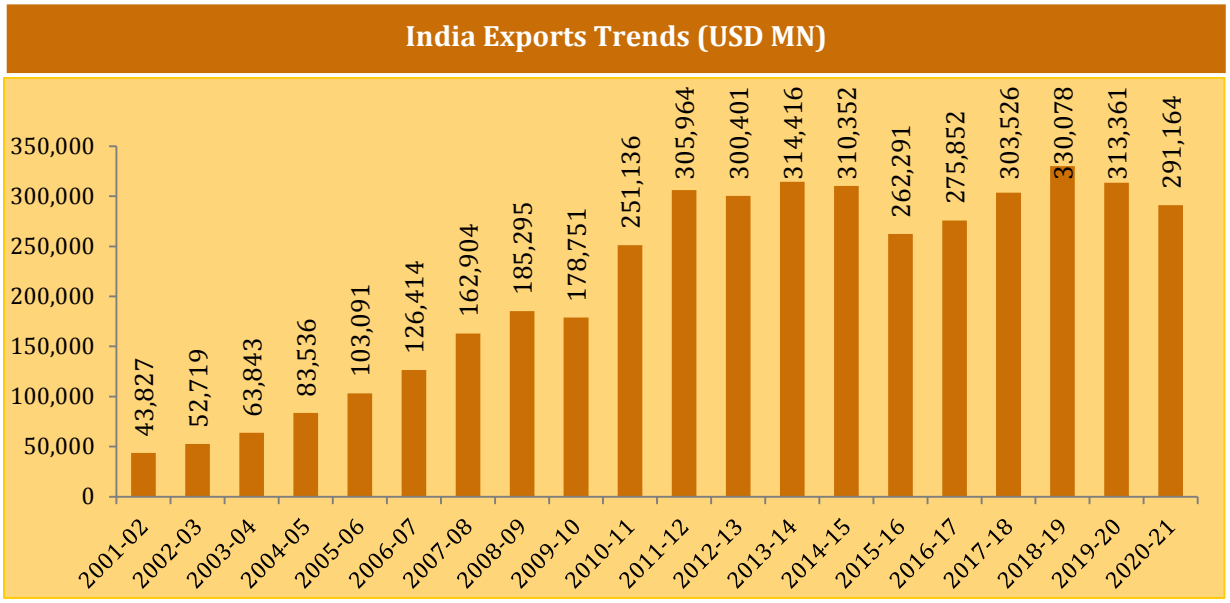


Figure 9: *India Exports Trends (USD MN)*

While the future of the economy is robust, structural reforms to increase domestic demand will accelerate growth over the next 3 years due to strong base effect. According to Moody's, the Indian GDP is expected to rebound with a growth of 9.3% in FY 2021-22

Some positive indicators for the Indian economy now:

- PMI manufacturing has gone up to 56. Highest since 2012. Indicates economic expansion has started.
- Pickup in Agri procurement, fertilizer sales, energy consumption, freight movement, digital transactions and forex earnings points to green shoots
- FDI in India recorded an inflow of $73.45 billion in FY 2019-20, an increase of 18.5% over the previous fiscal
- GST Collections in April highest at Rs 1,41,384 Crores - an indication of buoyancy in trade
- Strong resources to manage external debt. Forex reserves at $589 Bn. Amongst top 5 in the world
- Emphasis on Self sustenance (Atmanirbhar). Selective import substitution has started in a big way.
- Financial sector clean-up in progress. Bank NPA resolution has been assigned highest priority
- Start-up ecosystem booming in India with more than 100 unicorns and a combined valuation of US$ 240 bn
- Increased focus on Digital reach, skill enhancement & inclusive economics

Chapter 5: Overview of Indian Food Processing Industry

5.1 Food processing Ecosystem

Food is an inherent factor and a strong backbone of economic growth for any country. India is the 2nd largest producer of food in the world[4]. The task of ensuring that the food produced reaches 1.35+ Bn Indians is complex and involves many stakeholders. There are 2,450+ APMCs and 4,800+ submarket yards regulated by the respective states in India[5]. Multiple levels of value addition activities are undertaken on the agri-produce in a food processing plant, which in turn produces the packaged and processed food products.

There are 40,162 Registered Food Processing Units *(as per Annual Survey of Industries 2017-18)* in India providing employment to 19.33 lakh workforce. Distribution in India involves serving a large, fragmented base of Kirana shops, there are 14,000+ organized retail outlets concentrated largely in urban areas and 12 Mn – 14 Mn unorganized retail stores spread over 5,000 towns and 600,000 villages across the country[6]. Food Processing Industry also has a wide variety of unregistered units / individuals and Home Enterprises who produce a wide variety of Food products and operate locally in a region. Unregistered food processing sector supports employment to 51.11 lakh worker as per the NSSO 73rd Round, 2015-16 and constitutes 14.18% of employment in the unregistered manufacturing sector.

5.2 Gross Value Addition by Food Processing Industries

During the last 5 years ending 2018-19, Food Processing sector has been growing at a Compound Annual Growth Rate (CAGR) of around 11.62% as compared to around 3.91% in Agriculture and 8.30% in manufacturing sector at 2011-12 Prices[7]. The Food Processing sector has also emerged as an important segment of the Indian economy in terms of its contribution to GDP, employment and investment. The sector and constitutes as much as 8.98% and 11.11% of GVA[8] in the Manufacturing and Agriculture sector respectively in 2018-19 at 2011-12 prices.

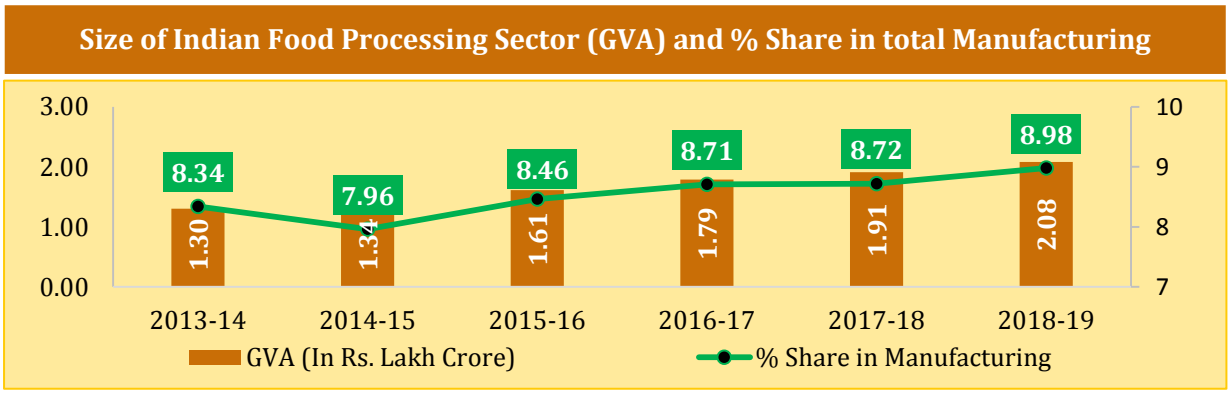


Figure 10: *Size of Indian Food Processing Sector (GVA) and % Share in total Manufacturing*

[4] http://www.fao.org/india/fao-in-india/india-at-a-glance/en/
[5] NABARD Annual Report 2014-15
[6] https://industrialoutlook.in/process-industry/food-industry-one-of-the-emerging-market-in-india/
[7] MoFPI Annual Report 2019-20
[8] MoFPI Annual Report 2019-20

5.3 Government Initiatives

Food processing sector is seen to have a potential to provide alternate employment opportunities to rural youth, who are currently dependent on agriculture or moving to urban areas for employment. Sine a large section of the population is dependent on agriculture and allied sectors, the income enhancement of such a large section of population is possible only through adding value in the food chain. Government of India has accorded high priority status to food industry with an objective to reduce inefficiencies resulting in wastages/ losses by setting up infrastructure (expect cold storage facilities) and generate huge employment in this sector. Some key government initiatives and support and discussed in detail below -:

Name of the Scheme	Key Details
Pradhan Mantri Kisan Sampada Yojana[9]	• In February 2020, under the Pradhan Mantri Kisan Sampada Yojana, the Indian Ministry of Food Processing Industries (MoFPI) sanctioned 39 mega food parks (MFPs) and 298 integrated cold chain projects across the country • The initiative was introduced to fill the gaps across the value chain in the country, to facilitate seamless transfer of perishables from production to consumption areas
PM Formalisation of Micro food processing Enterprises Scheme (PM FME Scheme)[10]	• In May 2020, a scheme of INR 100 Bn was announced under the Atmanirbhar Bharat Abhiyan, for the formalization of micro food enterprises. • In June 2020, the Prime Minister Formalization of Micro Food Processing Enterprises (PM-FME) scheme was launched as a part of the Atmanirbhar Bharat Abhiyan[11] • The scheme is expected to create ~900,000 employment opportunities (skilled and semi-skilled jobs) and generate investments of around INR 350 Bn
Production Linked Incentive Scheme for Food Processing Industry (PLISFPI) [12]	• As a part of Prime Minister's announcement of Aatmanirbhar Bharat Abhiyan, Government of India approved a new Central Sector Scheme 'Production Linked Incentive Scheme for Food Processing Industry' for implementation during 2021-22 to 2026-27 with an outlay of Rs. 10,900 crores • Key aim is to increase the export sales in 6 years by INR 27,816 crs. And employment at the end of year 5 by 2,47,730
Operation Greens (TOP to TOTAL)[13]	• Ministry of Food Processing Industries (MoFPI) has recently extended the Operation Greens Scheme from Tomato, Onion, and Potato (TOP) to all fruits & vegetables (TOTAL) for a period of six months on pilot basis as part of Aatmanirbhar Bharat Abhiyan

[9] https://mofpi.nic.in/Schemes/pradhan-mantri-kisan-sampada-yojana
[10] https://www.mofpi.gov.in/pmfme/
[11] https://mofpi.nic.in/pmfme/
[12] https://pib.gov.in/PressReleasePage.aspx?PRID=1708691
[13] MOFPI website

Name of the Scheme	Key Details

	• The objective of intervention is to protect the growers of fruits and vegetables from making distress sale due to lockdown and reduce the post - harvest losses.
	• Ministry will provide subsidy @ 50 % of the cost of the following two components, subject to the cost norms:
	  ○ Transportation of eligible crops from surplus production cluster to consumption centre; and/or
	  ○ Hiring of appropriate storage facilities for eligible crops (for maximum period of 3 months)
	• Eligible Entities: Food Processors, FPO/FPC, Co-operative Societies, Individual farmers, Licensed Commission Agent, Exporters, State Marketing/Co- operative Federation, Retailers etc. engaged in processing/ marketing of fruits and vegetables

Scheme of Human Resources and Institution Skill Development (SHRISD) – Part of Pradhan Mantri Kisan Sampada Yojana[14]	The objectives of the scheme are as follows: • To provide sector specific skilled workforce from floor level workers, operators, packaging, and assembly line workers to quality control supervisor etc. in the various segments of food processing industries. • To contribute towards achieving the projected skilled human resources requirement as envisaged by National Skill Development Corporation (NSDC) in food processing sector i.e., 17.8 million persons by the year 2022. • The Ministry is collaborating with the Food Industry Capacity and Skill Initiative (FICSI), the sector Skill Council (SSC) in food processing, for the validation of the Qualification Packs (QPs) for identified job roles and developing course curriculum for food processing sector through the National Institute of Food Technology Entrepreneurship and Management (NIFTEM).

Table 8: *Key Government Initiatives for the sector*

5.4 Market Drivers and Future Growth

The Government of India has come out with some very strategic initiatives for the development of the food processing sector, a few a listed below[15] -:

- Exempting all the processed food items from the purview of licensing under the industries (Development and Regulation) Act, 1951.
- 100% Foreign Direct Investment (FDI) permitted through automatic route for food processing sector subject to sectoral regulations

[14] https://mofpi.nic.in/Schemes/human-resources-and-institutions/skill-developement
[15] MOFPI Annual Report (2019- 20)

- 100% Foreign Direct Investment, under Government approval route, for trading, including through e-commerce, in respect of food products manufactured or produced in India.
- Lower GST for raw and processed product; nearby 80% food products are covered in lower tax slab of 0%, 5% and 12%.
- Provision of profit linked tax holiday under Section 80 IB, and investment linked deduction under Section 35 AD of Income Tax Act, 1961.
- Classifying loan to food & agro-based processing units and Cold Chain under agriculture activities for Priority Sector Lending.
- Cold Chain and Food Parks covered under Harmonised Master List of Infrastructure Sub-sector
- Incentivizing creation of infrastructure, expansion of Processing Capacity and developing technology to convert raw produce into value added products
- Setting up of a Special Fund of ₹2000 crore in National Bank for Agriculture and Rural
- Development (NABARD) to provide affordable credit for designated Food Parks and agro-processing units
- Simplifying Application Forms of all the schemes and minimizing requirement of documents.
- Assisting creation of skill infrastructure in Food Processing Sector and skill development initiatives through the Sector Skill Council [i.e., Food Industry Capacity and Skill Initiatives (FICSI)
- A stable and sustainable ecosystem for start-ups in food processing is critical to driving food innovation and expedite the growth. Innovative products focused on wellness, health and nutrition are likely to see a huge opportunity in the domestic market.
- MOFPI, through Food Safety and Standards Authority of India has strengthened the food testing eco-system in India, issuing licenses, creating awareness on food safety and training for Food Safety supervisors across the country. FSSAI is also responsible for setting up of Food Safety and Standards across sub sectors

The Indian food processing industry is also well supported by a large number of research institutions like National Institute of Food Technology, Entrepreneurship and Management (NIFTEM), Indian Institute of Food Processing Technology (IIFPT), National Dairy Research Institute (NDRI), Central Food Technological Research Institute (CFTRI), National Research and Development Center (NRDC) and Central Institute of Fisheries Technology (CIFT), among others, which in a way is driving the growth of the market.

Demographic changes have played a crucial role, India's current population is nearly 1.3 billion, up from 670 million in 1980. The pace of growth is slowing, but the country's age structure promises continued gains for some time.

Rising Disposable Incomes that have generated income growth, increased consumer appetites and discretionary spending. This recreational spending appears promising for manufacturers and

service providers, especially in healthcare, hotel, leisure and household goods and service categories.

Changing lifestyles and the crunch of time is one of the major driving factors of growth that may continue to shoot facets like urbanization.

According to the National Investment Promotion & Facilitation Agency:

- By 2024, the food processing industry will potentially attract INR 250,000 Cr (USD 33 Bn) investments
- By 2030, Indian annual household consumption to treble, making India fifth-largest consumer
- 100% FDI is permitted under the automatic route in food processing industries and through government approval route for trading, including through e-commerce in respect of food products manufactured or produced in India attracts more investment going forward.

Food processing industry is developing at a decent pace with the promise of a brighter future that is propelled by the ever-increasing scope in the market. The huge amount of produce (Raw Materials) and scope of increasing it by making technology invade the far reaches of the country, this would mean tremendous opportunity for the industry

5.5 Factors impacting Food Processing Sector and Skill Development

The key factors impacting the rise in the Food Processing Sector are as given below:

- Changing demographics and rise of disposable income among Indians
- Increasing urbanisation and changing lifestyles
- Increased spending on Food Products
- Demand for Functional Foods / Nutraceuticals Food
- Increasing awareness and spending on Health
- Growth of Organised retail and Private Labels Penetration
- Quality Standards and Monitoring
- Internet has opened up borders and the global food cuisines are now available in India
- Introduction of new Manufacturing Technologies and Automation in the FP sector

These factors are all interlinked with each other and ultimately leads to the following outcomes

- Need for and increased availability of 'Quality' food products now more than ever in the country
- Branding of Food products has been taken to a next level and FP account for a major chunk of branding business in India

- Investments in modern food manufacturing has increased and most new projects are with new age manufacturing process
- New varieties of Food products are introduced on a daily basis - increased need for Food Products Development Technologists and Scientists
- Increased need for Food Products testing and certifications have increased and thus need for Labs and associated personnel
- Need for healthier food options and desire to eat healthy foods has led to a major need for Packed Foods and Branded Packed Foods, even in some unheard sectors like Meat Products and Marine Products in India.
- Increased spend on Packaging and new Packaging techniques and solutions by manufacturers to differentiate in the market, increase food safety and life of products.

All these outcomes point to the fact, that the Food Processing Sector is indeed changing fast and there is a constant need to upskill existing Food sector employees and also bring in new skill development initiatives in the sector.

5.6 Structural changes in labor employed in the Food Processing sector

Food Processing Industry is one of the major employment intensive segments constituting 12.38%[16] (at 3-digit of NIC classification) of employment generated in all Registered Factory sector in 2017-18. According to the latest Annual Survey of Industries (ASI) for 2017-18, the total number of persons engaged in registered food processing sector was **19.33 lakhs**[17]. In terms of the number of units manufacturing food processing products, the Annual Survey of Industries publishes the **Registered FPI Units** data, and as per the 2017-18 survey, it was estimated to be around **40,162 Units in Food Processing Industry**. Food Processing Industry also has a wide variety of unregistered units / individuals and Home Enterprises who produce a wide variety of Food products and operate locally in a region. **Unregistered food processing** sector supports employment to **51.11 lakh** worker as per the NSSO 73rd Round, 2015-16 and constitutes 14.18% of employment in the unregistered manufacturing sector.

The employees in the Registered Food Processing Sector grew from 16.62 Lakh in 2010-11 to 19.33 Lakhs in 2017-18 as shown below:

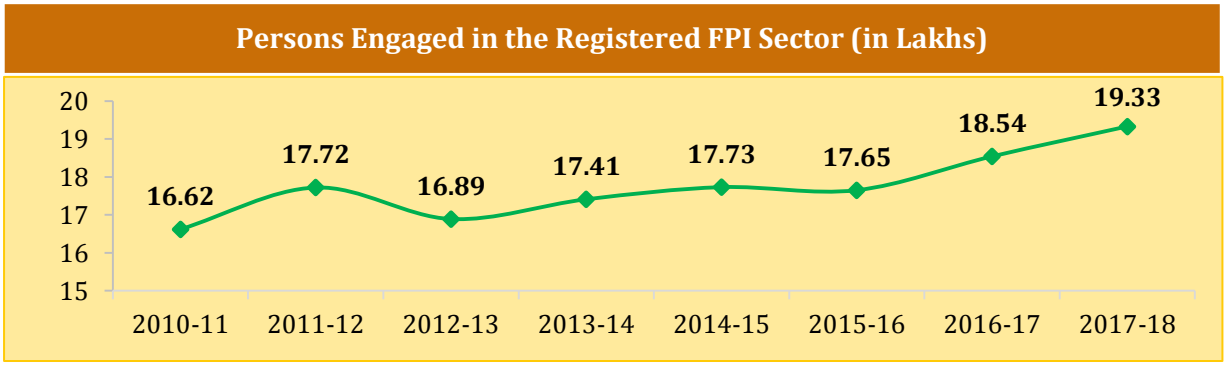


Figure 11: *Persons Engaged in the Registered FPI Sector (in Lakhs)*

[16] ASI 2017-18 data
[17] ASI 2017-18 data

Source: MOFPI Annual Report

Distribution of workers/ labour force in Food Processing Sector

The Food Processing Sector has a vast spread of Unregistered Units in the unorganised segments primarily as Household enterprises, single / few persons enterprises who operate in the local markets in various Food processing sectors such as Bakery, Processed Foods / Packed Foods / Dairy / Meat Processing / Beverages etc.

Informality/ Formality of labour force in Food Processing Sector and reasons thereof

Industry growth along with demand for quality standards and technology adoption in manufacturing are driving the need for fresh skilling and up-skilling in the sector

1. Predominantly concentrated by unorganised players, contractual or informal employees are recruited in high number as compared to other sub-sectors. For sub sector like fruits and vegetables, seasonality plays a big role in peak-time employment. However, these roles are contractual for jobs, such as packers and loaders. The employers in this subsector almost double their contract labourers during the peak season.

2. There is no homogeneity on the levels of education of the workforce; however, one can say that process operators are higher secondary or below and this forms the bulk of hiring. Workers and operators are hired locally from nearby areas where the plant is situated. Word of mouth and employee referrals or region-specific employment newsletters play a big role in hiring at this level.

3. The unskilled and low-skilled workers are at the margins. The government must focus on creating employment opportunities, perhaps through increasing the pace of skills and training to the workforce. Incentives should also be given to firms engaged in subcontracting with the unorganised micro and small establishments for raw material or intermediate products.

Existence of in formalisation of labour force in organised Food Processing sector

On account of the above reasons, there is an increased trend towards formalisation of the sector albeit at a slow pace. The Government of India through Ministry of Food Processing has introduced a new scheme called as PM Formalisation of Micro food processing Enterprises Scheme (PM FME Scheme) towards formalising this important part of the Food Sector.

A higher employability in the unorganised enterprises may be explained by the fact that food processing is a traditional sector that has strong backward linkages with agriculture. Most of the establishments are engaged in primary processing of wheat, paddy, oilseeds and spices and significantly contribute towards self-employment and labour absorption.

While, the schemes is a step in the right direction. However, the major concern remains with respect to the perceived impact of the scheme on generating large scale employment. A sluggish growth in employment is explained by a steady fall in labour intensity.

The real challenge, therefore is to accelerate employment, which is possible only if structural issues responsible for declining labour intensity are addressed. Increasing automation and mechanisation of production and rising wage to rental price of capital have badly hit demand for labour.

5.7 Impact of Covid-19 on the Food Processing sector

During the recent pandemic, the overall impact on the food processing industry was low compared to other Industries mainly due to its classification as essentials during covid times.

The food processing industry has been impacted in a selective manner, affecting select sectors like meat & marine segments negatively, as against packaged food (RTE/RTC) packaged atta, processed fruits and vegetables, frozen foods etc. that witnessed a positive impact. While consumers spent more time at home, the acceptability of processed food products increased and products which were positioned as hygienic and long shelf life gained significant prominence. At the same time the closure of HORECA segment impacted the institutional procurement of processed food. Experts believe this to be around 15 – 18% of the industry.

The pandemic has given rise to a new normal with sustainable food chains, growing preference for healthy food, localized food supply and changing food habits.

- **Food Safety & Sanitation -** In the post Covid-19 era, there is expected to be higher demand for measures on Sanitation by major economies to ensure food safety against transmitted chemicals and diseases.
- **Shift towards organic and healthy food -** Demand for healthy/ organic food and related products has gained momentum during the pandemic and is likely to increase significantly. Further, adoption of traceability in food products is likely to witness a steep rise.
- **Food security -** Adoption of technologies such as Artificial Intelligence (AI) and Big Data to find place towards food security issues – from farm handling, post-harvest, storage, and transportation processes is likely to gain traction in future.

The Indian food processing industry holds tremendous growth potential and has gained further traction due to the pandemic. Going forward, the industry is expected to adopt methods and processes, considering the opportunities created in both domestic and export markets.

Domestic demand has increased, not only from Urban cities, but Tier II & III cities and Rural areas as well.

- Health foods, snacks and RTE segments are likely to drive demand. Hotels & Restaurants will play a critical role as it recovers from the Pandemic. E-commerce is another element, enabling this reach to consumers at their doorstep.
- The industry is expected to move towards consolidation with the share of organized players to increase over the next 10 years. PM FME Scheme has been launched with the aim of this goal.
- Greater acceptance of regional players with better sustainability and moving towards increasing footsteps at national level.

Increased Exports opportunities:

- In the post Covid-19 era, India has an opportunity to become the food hub of the world and increase its share in exports. There is significant potential for enhancing exports from India to the top 10 global food markets, especially where it has limited presence. Major segments of export potential include meat & marine and dairy.
- An urgent need to develop scale, quality & cost-effective export capabilities meeting

global certification requirements so that the industry is competitive.

- Government of India can support the exporters by negotiating Free Trade Agreements, lowering Non-Tariff Barriers, and expediting implementation of Remission of Duties and Taxes on Exported Products schemes.

Need felt to improve infrastructure and existing Processing capacity:

- Opportunities in domestic and international markets in the post Covid-19 era require that the processing capacities in the food processing industry be enhanced significantly at all levels of the value chain.
- Production Linked Scheme (PLI) Scheme is likely to encourage players in food processing industry to enhance their processing capacities and meet the demand for rising challenges. There is a huge potential for complimentary industries such as food ingredients, food processing equipment, food logistics and food packaging.
- To enhance competitiveness and meet the hygiene needs at a scale, the players, especially MSMEs, will require high quality testing and certification infrastructure.

Online Learning has got a huge boost with Covid and could effectively be used to address a large and wide spread industry as Food Processing:

- The Pandemic has bought in a new set of rules of social distancing and effective sanitization. The Government of India has been very active in promoting these measures. There is a need to bring in these measures more effectively in a "Factory / Shop Floor" environment and most MSME firms in FP sector needs to be trained and educated on these measures.
- One of the great innovations the world has seen during the pandemic year was the effectiveness of online modes of interaction and teaching, starting from a Junior School High School, Colleges to large Corporates. Most segment of the Society has learnt the power using Social Media and Online mediums for learning.
- FP sector being such a wide and spread out sector with clusters in every part of the country could benefit from this Pandemic and use the Online / Mobile Learning Apps as medium for skill enhancements and could effectively provide a wide range of skills training through this mechanism.
- The Government of India, through the Institutions involved in enhancing Skills in FP sector needs to invest in such mediums and come out with a new Skill enhancement programs and solutions.
- Need to involve a series of new start-ups and Industry Veterans who can help in creating such Skilling ecosystem for the Sector.

Chapter 6: Sub-Sectoral Analysis – Bread & Bakery Products

6.1 Market summary

Bread & Bakery is one of the largest segments in the food processing sector in India and offers huge opportunities for growth, innovation, and job generation. The market consists of retail sales of baking ingredients, baking mixes, bread & rolls, cakes, pastries & sweet pies, sweet biscuits, dough products, energy bars, morning goods and savoury biscuits. The Indian bakery & bread market has experienced strong value and volume growth in recent years. Besides daily household consumption, growth in the fast-food chains as well as introduction of value-added bakery products is giving an impetus to the market growth. The growth of the organised sector is set to increase to approx. 70% by FY'30. This is because large companies are spending on R&D, launching premium products and cakes, improving on their market reach and distribution, trying to understand the needs of the youth, and venturing into new categories. Availability of better ingredients such as chocolate, toppings, fillings, flavours and demand for organic products like flours made from buckwheat, quinoa, millet, amaranth, flax, corn, rice, sorghum, wild rice, and other non-wheat grains has helped many companies to produce international quality products. The Indian bakery market is being driven by the growing demand for biscuits and cookies. Due to growing population and urbanization, Indian bread and bakery industry likely to experience healthy growth in the coming years. With the increasing consumer demand for new and healthy food options, the industry is further experiencing fortification of bakery products to satiate the appetite of the health-conscious people. The growing penetration of bakery chains is further triggering the growth of the industry in India.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	3,675
No. of registered units	1,996
Past Growth rate (CAGR) (FY' 15 – FY' 20)	7.6%
Total Number of Employees (FY' 20)	1,35,233 nos.
Overall Exports (FY'20)	INR 2,433 Crs.
Expected Market ('000 MT) (FY' 30)	8,750
Future growth rate (FY' 20 – FY' 30)	9.1%
Total Employee Estimation (FY' 30)	3,21,983 nos.
Overall Employment Additions (FY' 20 – FY' 30)	1,86,750 nos.

Table 9: Bread & Bakery : Key Industry Indicators

6.2 Present State of the Industry & Future Outlook

Bread and Bakery segment is one of the largest segments in the food processing sector in India and offers huge opportunities for growth, innovation, and job generation.

As the second largest producer of biscuits after USA, India is a key player internationally, and with the entrepreneurial spirit of Indian companies and individuals it is one of the most exciting regions for the bakery sector.

As breads and biscuits are fast-moving consumer goods (FMCG), they are consumed on a daily basis by the consumers which increases the sales of these products in India. In addition to this, growth in the fast-food chains further stimulates the demand for breads as they are used in sandwiches, burgers, soups, snacks, etc.

The bread & bakery market consists of retail sales of baking ingredients, baking mixes, bread & rolls, cakes, pastries & sweet pies, sweet biscuits, dough products, energy bars, morning goods and savory biscuits. The Indian bakery & bread market has experienced strong value growth and volume growth in recent years.

Moreover, introduction of value-added bakery products is giving an impetus to the market growth. Apart from this, busy lifestyles, changing eating habits and western influence has reflected in a strong demand for bakery products in India.

Britannia is the leading company in the market, holding the largest market share in 2019. Parle Products Pvt Ltd and ITC Limited also have a strong presence in the country, accounting for the second and third largest value shares in the same year.

Artisanal producers - i.e., small/independent bakeries that produce their own products for sale (usually onsite) - hold a significant position in the market.

There are around 1,996 bread and bakery producers in the organized sector. The organised bakery segment of the country produces nearly 3.6 MMT of bread and bakery products. The increasing production can be presented based on the development of traditional products, and the expanding range of non-traditional varieties. Besides, market-system shows that the products are more competitive and more profitable in recent times.

Value chain of Bread and Bakery market in India

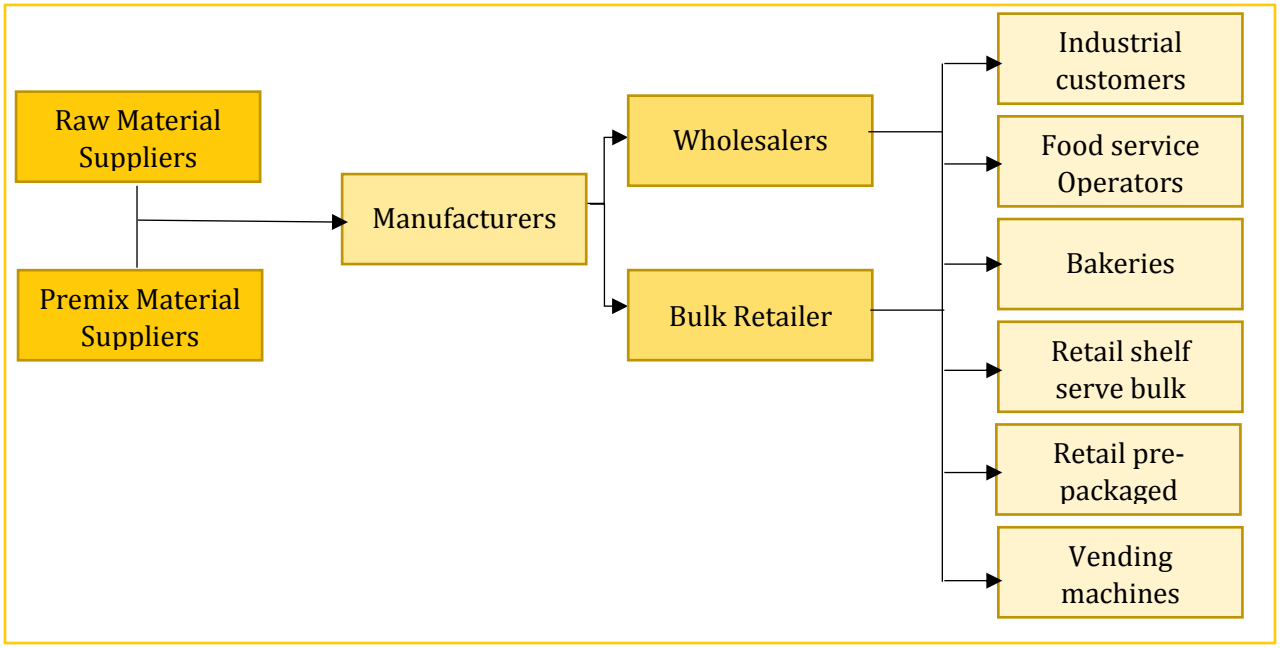


Figure 12: *Value chain of Bread and Bakery market in India*

Manufacturing Clusters

Southern India dominates the market for biscuits & cookies segment while the bakeries segment spread across regions

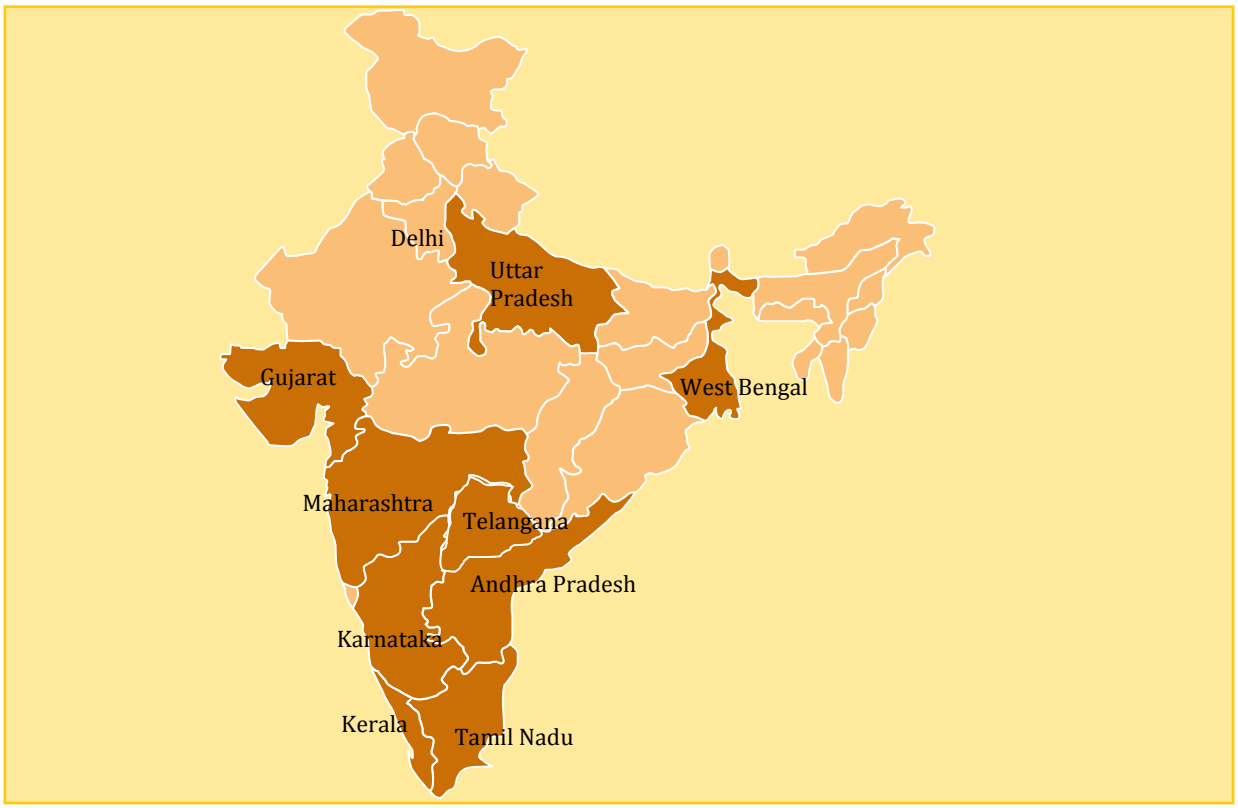


Figure 13: *Manufacturing Clusters*

Top 10 states account to 84% of total employment in the bread & bakery industry

Market Overview

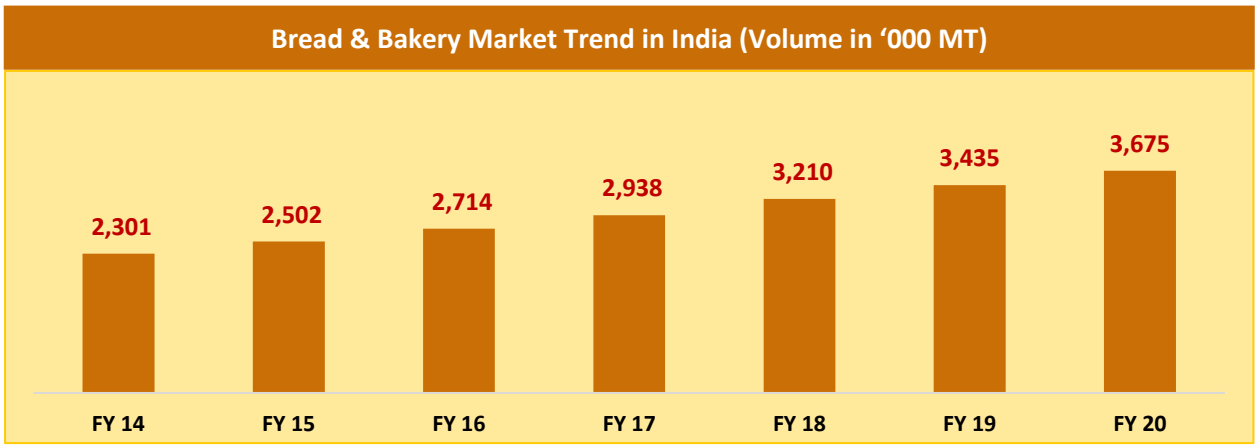


Figure 14: *Bread & Bakery Market Trend in India (Volume in '000 MT)*

Source: AIBMA; Feedback BoK

Product segment includes of Cookies, Savory Biscuits, Break & Rolls, Cakes, Pastries, Sweet pies, Breakfast cereals and morning goods among others

Exports of overall Bread & Bakery Products under the 4 digit HS Code 1905 (Rs. Cr)

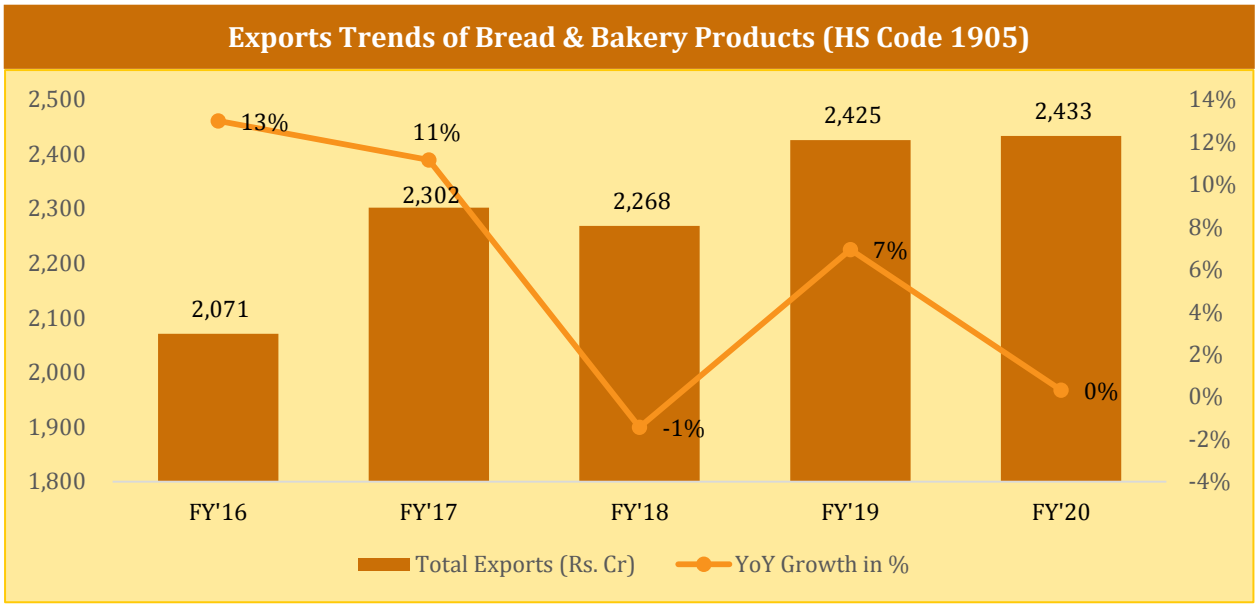


Figure 15: *Exports Trends of Bread & Bakery Products*

Source: Ministry of Commerce & Industry (Tradestat)

6.3 Present Employment Scenario & Analysis

Category of the Companies by Revenue

Category of the Company	Definition (Annual Revenue Range)	Remarks
Micro Enterprises	< Rs 5 Cr	Micro enterprises are primarily small-scale manufacturer or Artisan Baker (industrial manufacturers) baking a wide variety of breads, cakes and other bakery products from scratch
Small Enterprises	RS 5.1 – 50 Cr	Small enterprises would typically bake wide range of bread and bakery products focusing specific region
Medium Enterprises	Rs 50.1 – 250 Cr	Medium-Sized Enterprises predominantly have multiple region presence focusing across product categories.
Large Enterprises	> Rs 250 Cr	Large Sized Enterprises are organized players focusing multiple products within bread and bakery sector

Table 10: *Category of the Companies: By Revenue*

6.3.1 Sample Coverage by Categories of Companies & Region

The detailed primary research exercise undertaken by Feedback Consulting for this report involved meeting over 412 companies across India and across category of players.

>80% of these companies were Micro and Small Enterprises and 63% of these companies are clustered in Southern and Western region.

Category of the Company	Sample Coverage (N)	East	North	West	South
Micro Enterprises	197	18%	22%	24%	36%
Small Enterprises	138	19%	12%	39%	30%
Medium Enterprises	67	27%	9%	42%	22%
Large Enterprises	10	20%	40%	20%	20%
Total	412	20%	17%	32%	31%

Table 11: Sample Coverage by Categories of Companies & Region

6.3.2 Total No. of Employees

Past Trend of employment in the organized Bread & Bakery Industry

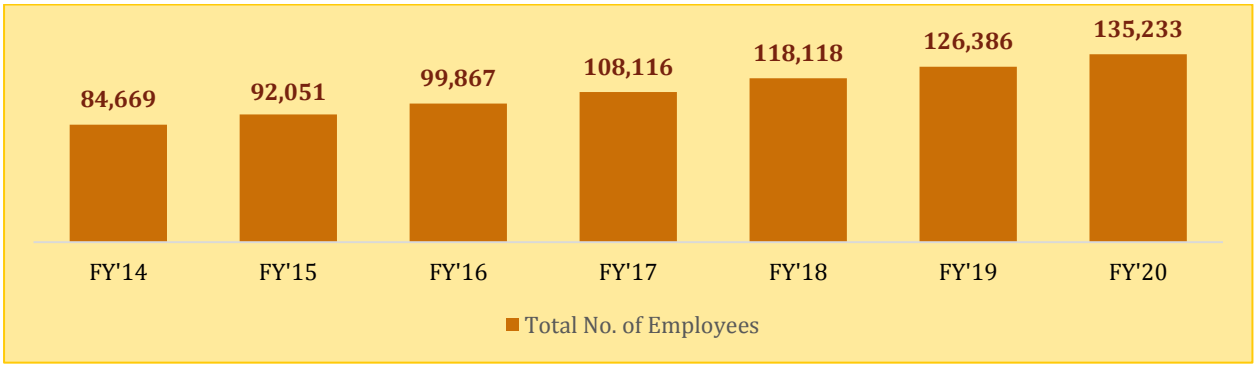


Figure 16: Past Trend of employment in the organized Bread & Bakery Industry

Source: Feedback Analysis

Share of Employees (FY'20): Break by Different Category

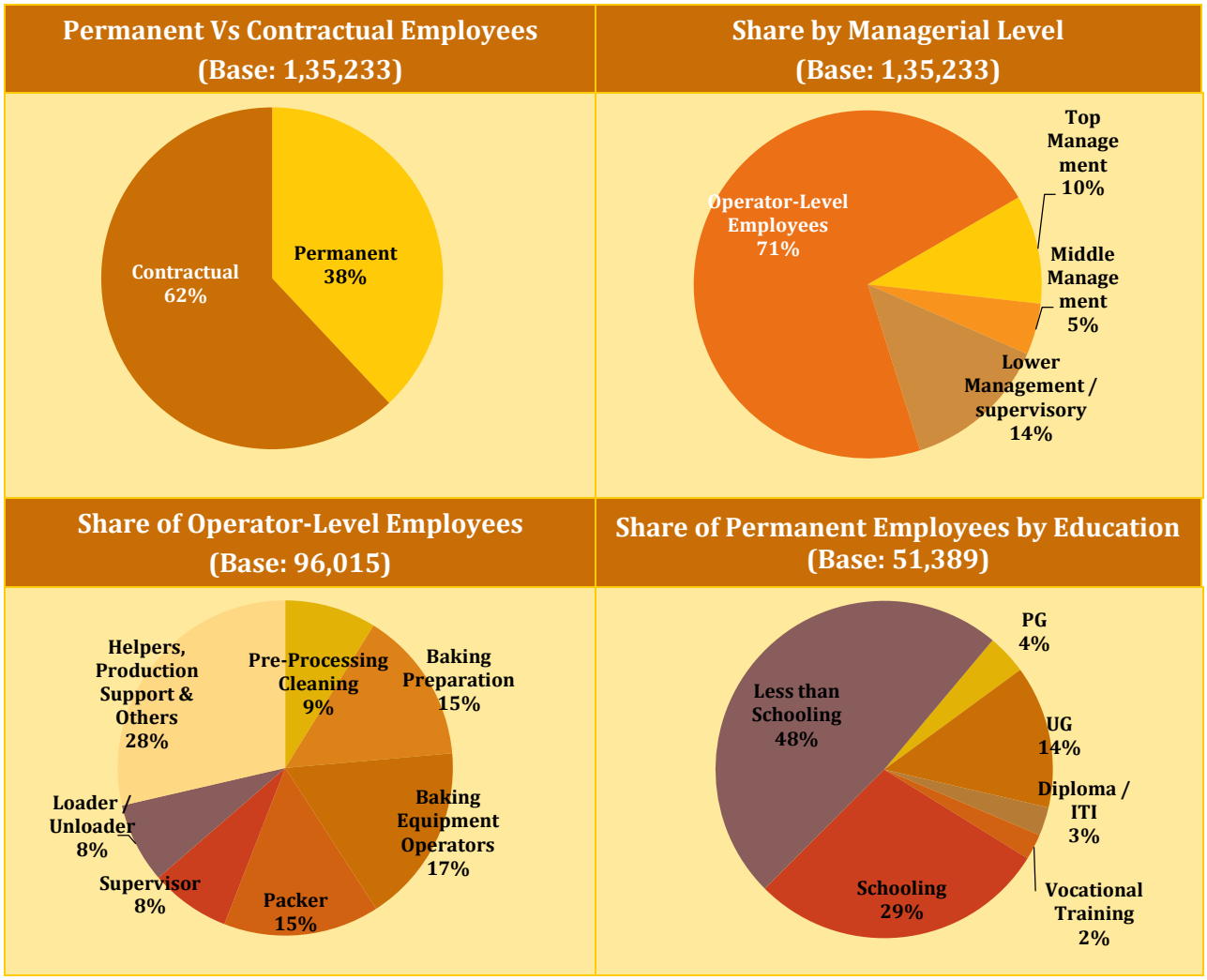


Figure 17: Share of Employees (FY'20) : By Different Category

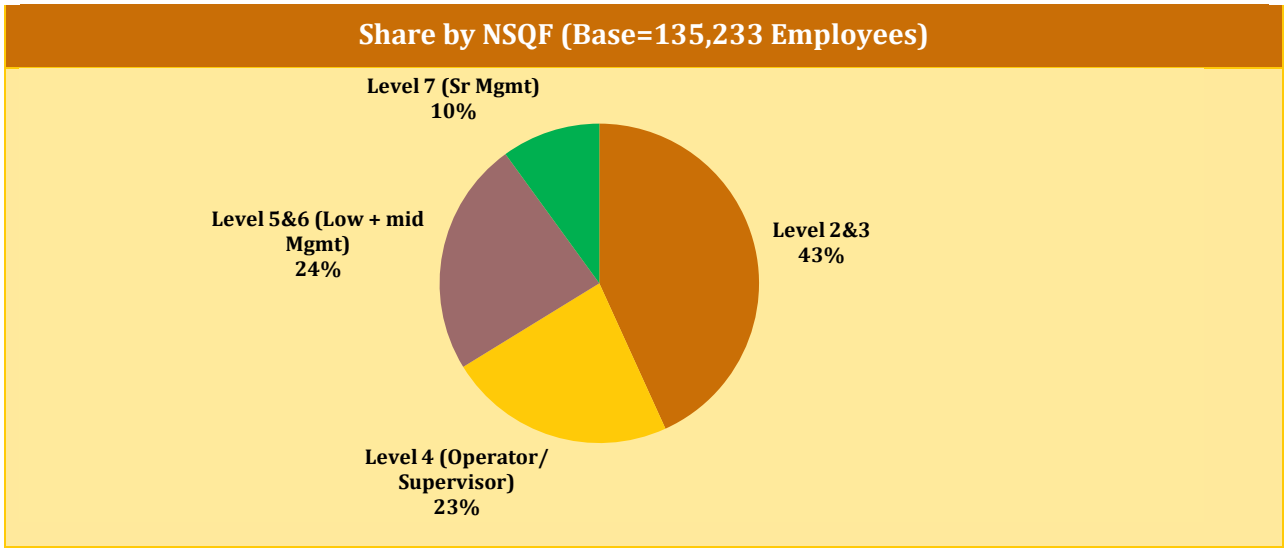


Figure 18: Share of Employees (FY'20) : By NSQF levels

Source: Feedback Analysis

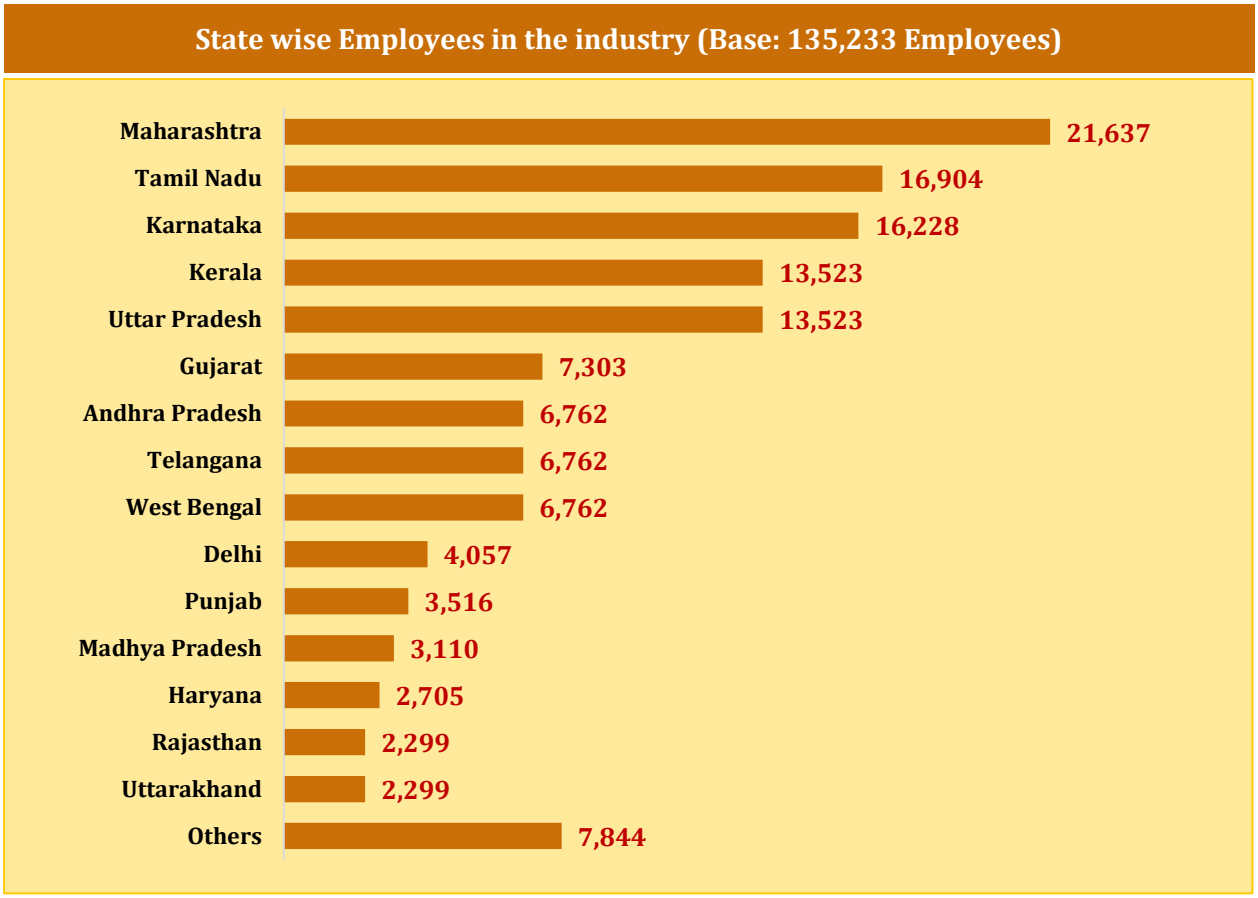


Figure 19: *State wise Employees in the Industry (FY'20)*

Source: Feedback Analysis

Top 15 states account to 94% of total employment in the industry

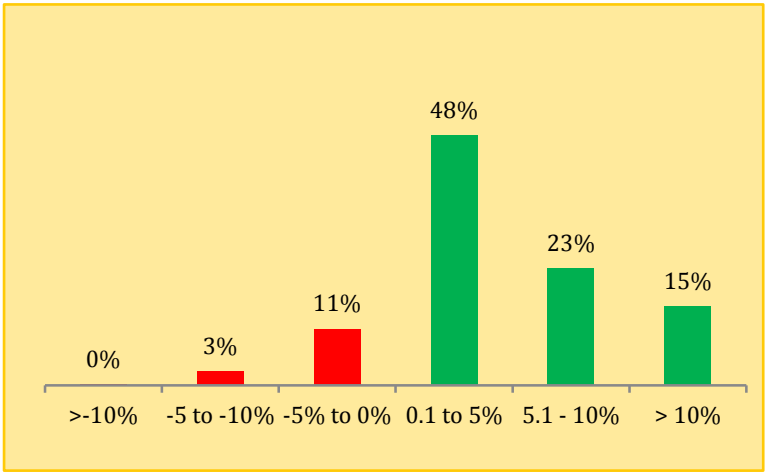
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Pre-Processing Labourers	The pre-processing work includes primarily grinding flours; grading and sorting nuts and other ingredients; filtering or cleaning flours, etc.	3	✓	✓	✓	✓
2	Mixing Technician	Mixing technician prepares different types of dough used in making baked products by using various methods such as weighing, mixing, kneading, fermenting and relevant responsibilities	4			✓	✓

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
3	Production Specialist	Production Specialist produces biscuits, breads, and other baked products in the production unit by weighing, mixing, kneading, rolling/sheeting, cutting, moulding, baking, cooling, etc. either manually or using machineries. This job role is specific to large enterprises	4	✓	✓	✓	✓
4	Baker (Craft Baker or Plant Baker)	This job role is applicable for micro, small & medium units where the Baker produces baked products (breads, puffs, cookies, cakes/ pastries, desserts, specialty baked products, etc.) by measuring raw materials and ingredients, mixing, kneading, fermenting, shaping, and baking	4	✓	✓	✓	
5	Baking Technician	Responsible for baking of products	4			✓	✓
6	Machine Operator (Oven / Packing Machinery)	Operating machine and also for maintenance of machines	4			✓	✓
7	Shift Supervisor	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
8	Helpers	Misc. work including cleaning plants, Machinery after every batch, etc.	3	✓	✓	✓	✓
9	Loader / Unloader	Material handling, Loading & Unloading products.	3	✓	✓	✓	✓
10	Accountant / Invoicing Clerk	Managing accounting and day to day transaction entry in the ledger	4	✓	✓	✓	
11	Sales and Distribution Support	Sales Executives / Distribution to the Channel Partners	4			✓	✓

Table 12: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

6.3.3 Past Growth of Employees (FY'17 – FY'20)



- <15% of the enterprises have experienced degrowth in their manpower in the past 3 years.
- 48% have indicated that their manpower has grown marginally (up to 5%).
- 35 – 40% experienced the growth on >5% in the past 3 years

Figure 20: *Past Growth of Employees (FY'17 – FY'20)*

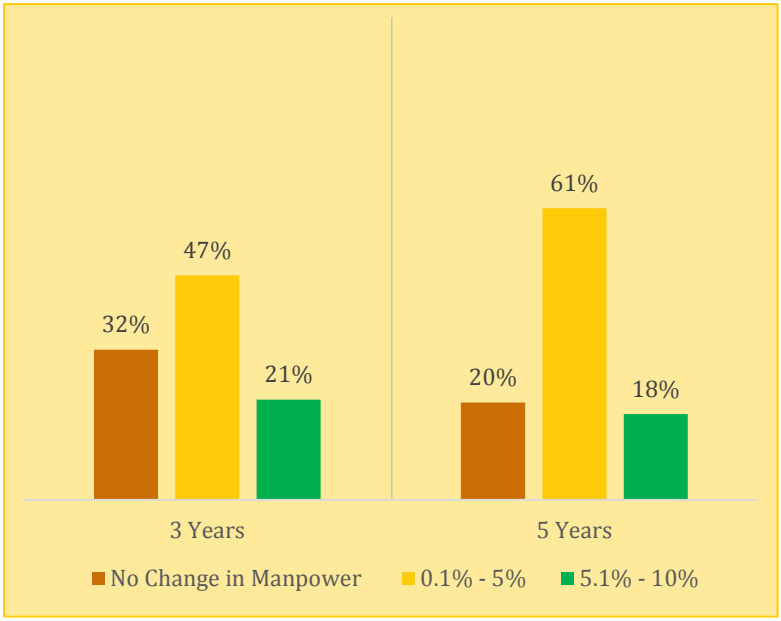
6.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Planning to invest in Internet of Things (IoT) or Automation	59%	67%	21%	100%
Plan to invest on new equipment	50%	51%	24%	100%
Plan to enhance the production capacity	73%	64%	22%	100%
Plans to launch new products	52%	38%	25%	100%
Plans to increase exports	4%	2%	18%	100%
Plans to invest on R&D	1%	8%	7%	60%

Table 13: *Future plans of companies covered*

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- 2% – 3% in next 3 & 5 years (Average)

Figure 21: *Manpower Recruitment Plan, Considering the Future Operational Expansion Plans*

Source: Feedback Analysis

6.4 Recruitment & Training Practice

Recruitment Practice

Walk-in is the key source of recruiting candidates across Operational level and Lower-level employees. Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal training institutes offering food technology / food science programs
Middle Management	• Formal training institutes offering food technology / food science programs
Lower-Level Management	• Regional training institutes (Craft Baker or Plant Baker) • Most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 14: *Recruitment Practice*

Training Practice

Overall ~35% of the companies we have covered as part of the sample are providing training across levels when an employee joins the firm (On-the-Job training).

% of Companies offering training

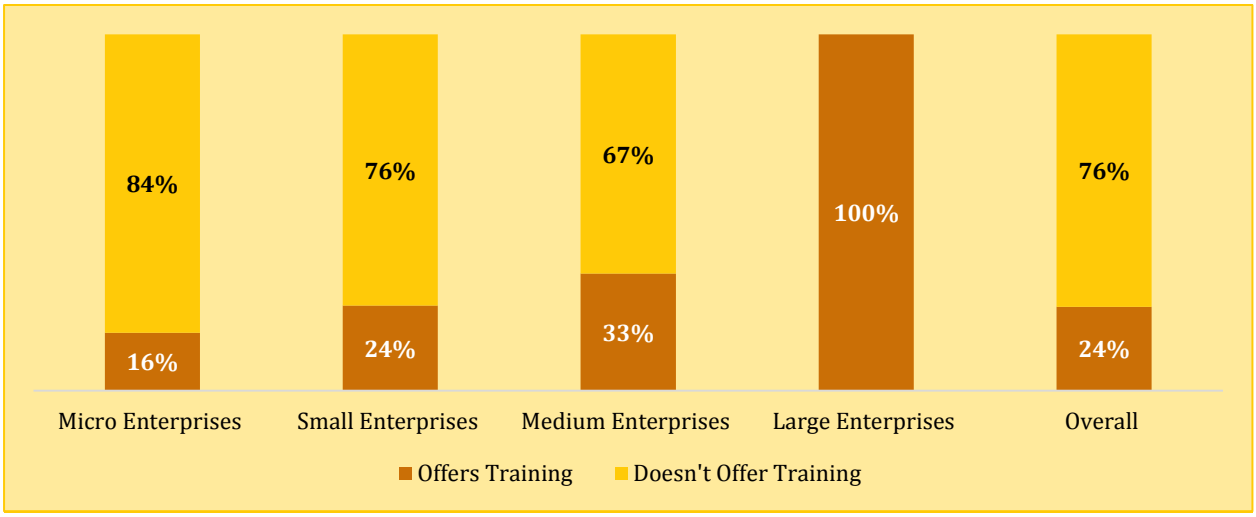


Figure 22: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered (Encountered in Primary Interviews)

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Processing Operations	Proper filtering or cleaning the flour; Sorting; grading the raw materials	Operator Level Employees	✓	✓	✓	✓
Mixing Techniques	Most of the companies do have unique ingredient mix / different ratio mix. Training on those mixes by products becomes mandatory for all employees	Operator Level Employees; Lower-Level Employees; Supervisors / Managers	✓	✓	✓	✓
Baking	Baking techniques; operating machines; etc.	Operator Level Employees & Lower-Level Employees	✓	✓	✓	✓
Operations Management	Training to detail the overall operations, manpower allocation, inspection, etc.	Supervisors / Managers			✓	✓

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Supervision of product handling activities	Appropriate packing methods, latest technology, equipment operations, etc.	Supervisors / Managers			✓	✓
Plant Maintenance	Maintenance checklist for equipment (processing and packing)	Operator Level Employees & Lower-Level Employees (Technicians / Machine Operators)				✓
Packing	Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio					✓

Table 15: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

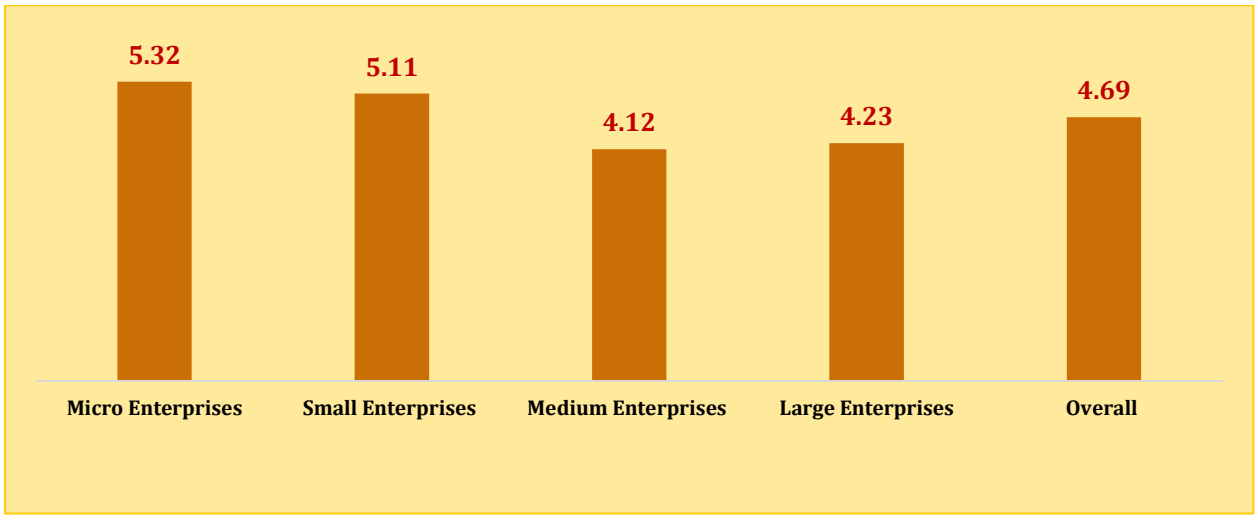


Figure 23: Effectiveness of Training

Source: Feedback Analysis

6.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

Limited Skilled / Semi Skilled Employees Available

- Skilled workers in this industry are very limited. Support from academic institutions is not in line with the industry expectations.
- New equipment, automation, etc. are going on one side where the trained workers availability becomes challenge on another end.
- The sector is very unorganized and every unorganized sector comes with its own set of challenges like employment is subject to high degree of insecurity.

Poor Knowledge on Sourcing Trained Labour

- Small and Micro units depend on walk-ins or known contacts for unskilled or semi-skilled labours. The primary reason for the same is limited awareness of the training institutes in the vicinity that offers programs on craft bakery or plant baker and other relevant programs

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by type of Enterprises			
				Micro	Small	Medium	Large
Plant Manager / Production Manager	Mid Management NSQF: 6	• Equipment operations (across functions) • Managerial Skills • Technical Know-how across functions • Leadership Skills • Training manpower at the lower level or operator level • Production planning	• Understanding and adaptation to newer technologies • Lack of knowledge on equipment maintenance and operations • Ability to work with both the processing and packaging equipment	✓	✓	✓	✓
Quality Control	Mid Management NSQF: 5	• Monitoring the Raw Materials quality • Ingredient's quality check	• Unable to maintain the similar quality across batches	✓	✓	✓	✓

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by type of Enterprises			
				Micro	Small	Medium	Large
		• Assessing the quality for the finished products					
Shift Supervisor / Supervisor	Lower-Level Management NSQF: 5	• Overseeing operations including material handling across functions • Equipment operations and maintenance	• Best practices w.r.t material handling to reduce wastage during material handling	✓	✓	✓	✓
Maintenance Officer	Lower-Level Management NSQF: 5	• Knowledge on latest equipment and the old equipment (primarily for maintenance) • Domain Skills	• Lack of update in technology	✓	✓		
Loading / Unloading Labors	Operator Level Employees NSQF: 3	• Materials Handling	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygienic awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓		

Table 16: Key job roles and their required skills and skill gaps

6.6 Future Projection – Sector & Employment

Projected growth in Bread and Bakery products production in India

Based on all discussions conducted with the Visionaries and Industry experts, Indian bread and bakery production likely to reach approx. 8.75 Mn MT by FY'30. This indicates CAGR of approx. 9.1%.

Reasons for such growth are the followings:

- The Indian bakery market is being driven by the growing demand for biscuits and cookies. Due to growing population and urbanization, Indian bread and bakery industry likely to experience healthy growth in the coming years.
- With the increasing consumer demand for new and healthy food options, the industry is further experiencing fortification of bakery products to satiate the appetite of the health-conscious people.
    - The launch of healthy products in the bakery segment is increasing and is gaining popularity at a high rate.
    - The growing penetration of bakery chains is further triggering the growth of the industry in India.
- Bakery products like bread and biscuits are quite popular among millennials due to their convenient and affordable nature. Further, the growing use of online platforms in India is enhancing the 'click and collect' trend, with millennials ordering baked goods online.
    - This still is an untapped market in India and is expected to create huge revolution in the future, thus, aiding the Indian bakery market further.

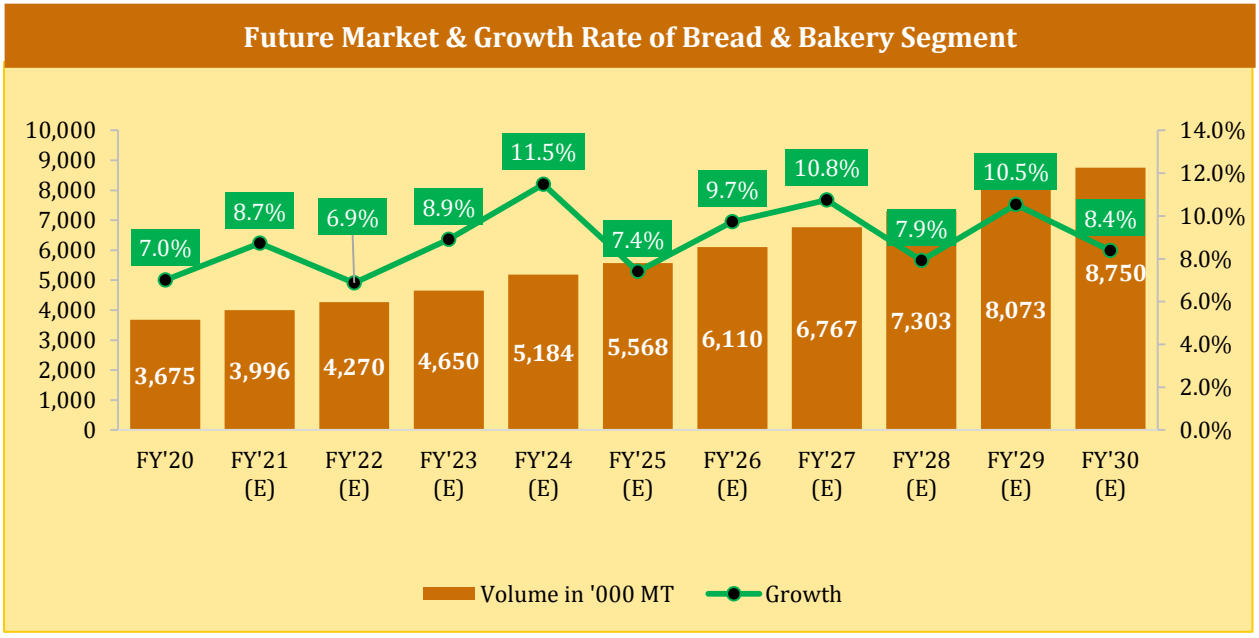


Figure 24: Future Market & Growth Rate of Bread & Bakery Segment

Source: Interactions with SMEs & Visionaries

Processing capacity and investment required in the sector

Parameter	Unit	Values
FY'20 Production	'000 MT	3,675
FY'30 Production (E)	'000 MT	8,750
Increase in production between FY'20 & FY'30	'000 MT	5,075
Considering 80% capacity utilization, additional processing capacity required	'000 MT	6,344
Investment norm*	Rs. / MT	75,000
Total Investment required	**Rs. Cr.**	**47,578**

Table 17: Processing capacity and investment required in the sector

**Source: Discussion with Plant & Equipment Manufacturers & SMEs*

There are well noted investments in Bread & Bakery and associated segments. Below mentioned projects are either in announced stage or already under implementation. Apart from the below mentioned key projects, UK-based yeast and bakery ingredients maker AB Mauri is planning to invest more than Rs. 400 Cr. in a greenfield project in Uttar Pradesh. At the same time, Britannia Industries had also evinced interest to invest Rs. 300 Cr. in a greenfield plant in UP.

Select ongoing and upcoming projects in the Bread & Bakery products sector

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	I T C Ltd.	Khurda Food Processing Park Project	Khurda, Odisha	New Unit	675
2	Britannia Industries Ltd.	Confectionary Products (Uttar Pradesh) Project	Kolkata, West Bengal	New Unit	300
3	Britannia Industries Ltd.	Biscuits (Gangaikondan) Project - Expansion	Kolkata, West Bengal	Capacity Expansion	250
4	Frisco Overseas Pvt. Ltd.	Bakery Products (Mohana) Project	Delhi	New Unit	200
5	Surya Foods & Agro Ltd.	Khurda Biscuit Manufacturing Plant Project	Khurda, Odisha	New Unit	109

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
6	Britannia Industries Ltd.	Bakery Products (Khurda) Project - Expansion	Kolkata, West Bengal	Capacity Expansion	94
7	Britannia Industries Ltd.	Odisha Bakery Plant Expansion Project	Odisha	New Unit	94
8	Jubilant FoodWorks Ltd.	Dough Balls (Adinarayanahoshalli) Project	Gautam Budh Nagar, Uttar Pradesh	New Unit	90
9	Mrs. Bector's Food Specialities Ltd.	Biscuits (Rajpura) Project - Expansion	Ludhiana, Punjab	Capacity Expansion	41

Table 18: Select ongoing and upcoming projects in the Bread & Bakery sector

Source: CMIE & Projects Today

FY'20 employment estimation in Bread and Bakery products industry in India

Company Category	Average no. of Employees	FY'20 Total No. of Employees in Bread & Bakery Sector	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	800	36,800	30%	1,103	30.0
Medium Enterprises	150	41,550	29%	1,066	25.6
Small Enterprises	50	37,500	26%	956	25.5
Micro Enterprises	21	19,383	15%	551	28.4
Total		*135,233*	*100%*	*3,675*	*27.2*

Table 19: FY'20 employment estimation in Bread and Bakery products industry in India

**Source: Discussion with the Bread & Bakery Manufacturers, Associations & SMEs*

Note: LMS classification has been made based on overall revenue of the companies. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection in Bread & Bakery products industry in India

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	30%	2,625	30.0	87,619	50,819
Medium Enterprises	29%	2,538	25.6	98,929	57,379
Small Enterprises	26%	2,275	25.5	89,286	51,786
Micro Enterprises	15%	1,313	28.4	46,150	26,767
Total		**8,750**		**321,983**	**186,750**

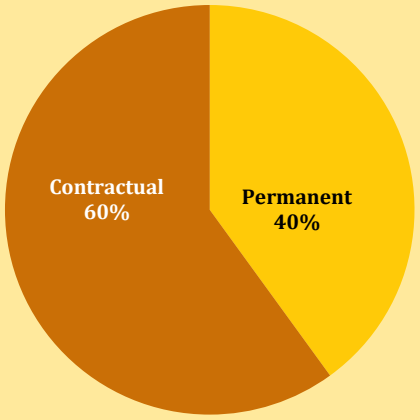
Table 20: Future employment projection in Bread & Bakery products industry in India

** As per discussion with the Bread & Bakery Manufacturers and SMEs, contribution of various types of companies in the Bread & Bakery products industry will remain same over next 10 years.*

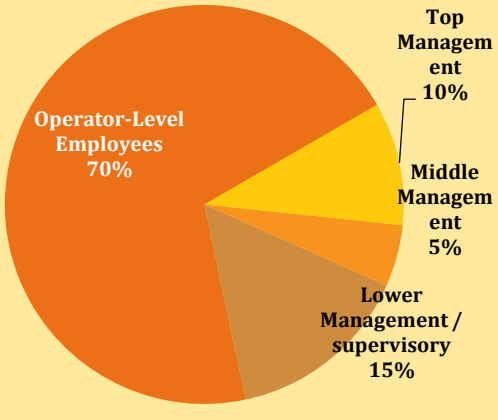
 # Based on discussions with equipment manufacturers and SMEs, there could be marginal adoption of automation / industry 4.0 in the coming years. However, that will have negligible impact on the productivity of the employees. Hence, the same productivity values have been considered for future employment generation potential.

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category

Permanent Vs Contractual Employees (Base: 1,86,750)



Share by Managerial Level (Base: 1,86,750)



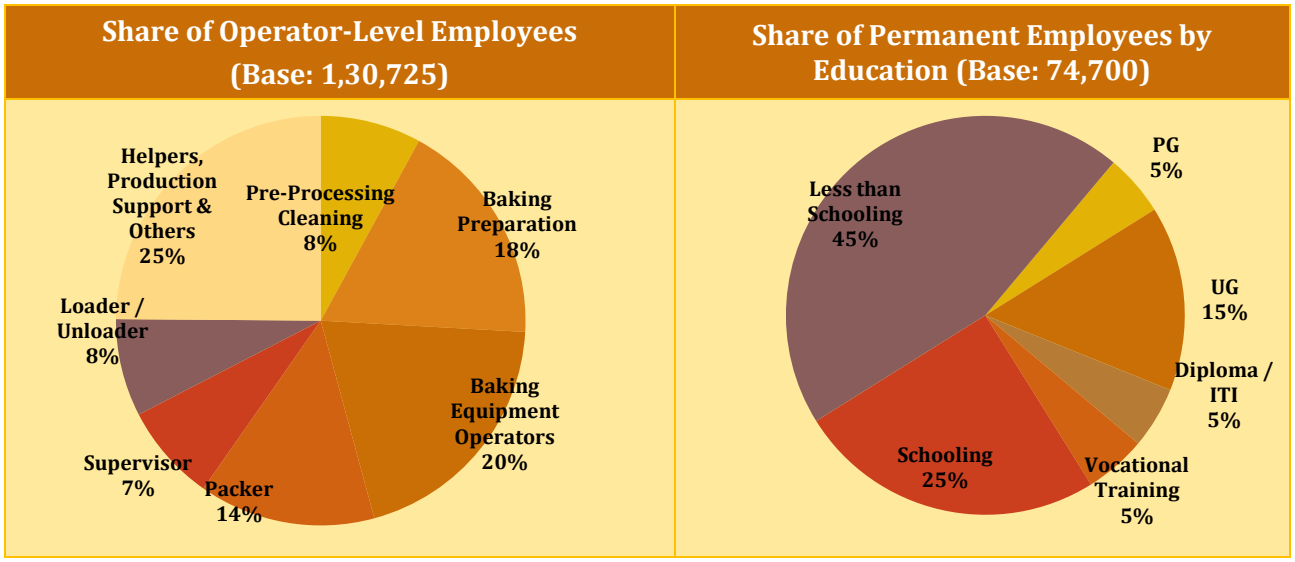


Figure 25: Share of FY'20 - FY'30 Employment Generation potential : By Different Category

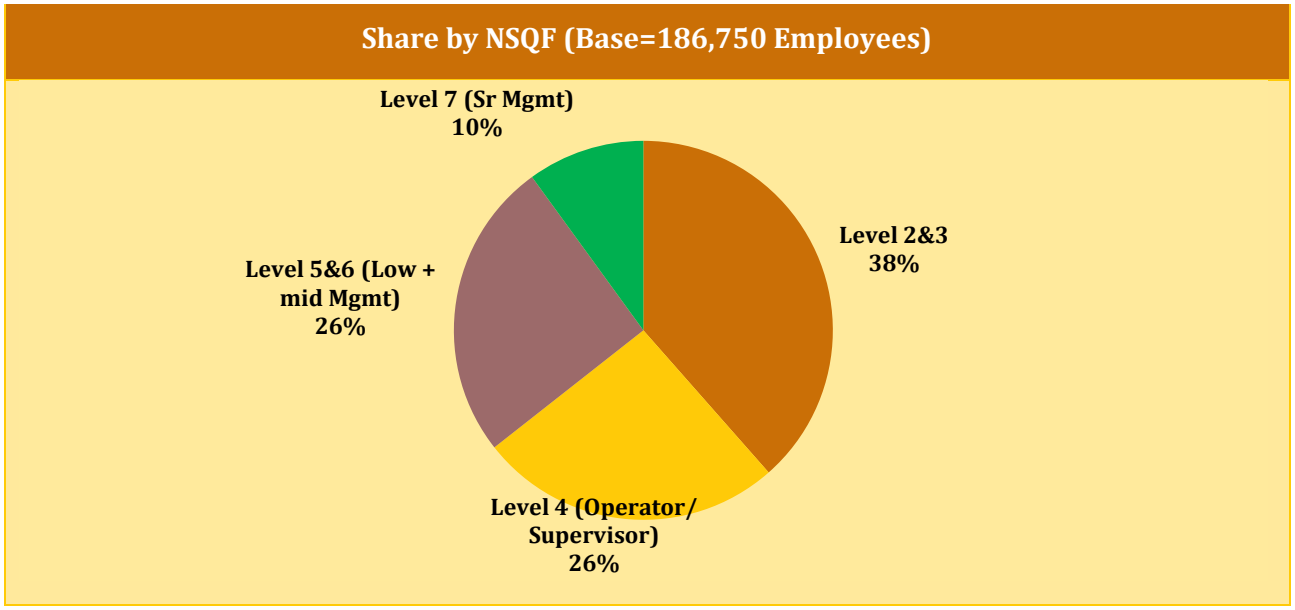


Figure 26: Share of FY'20 - FY'30 Employment Generation potential: By NSQF levels

Source: Feedback Analysis

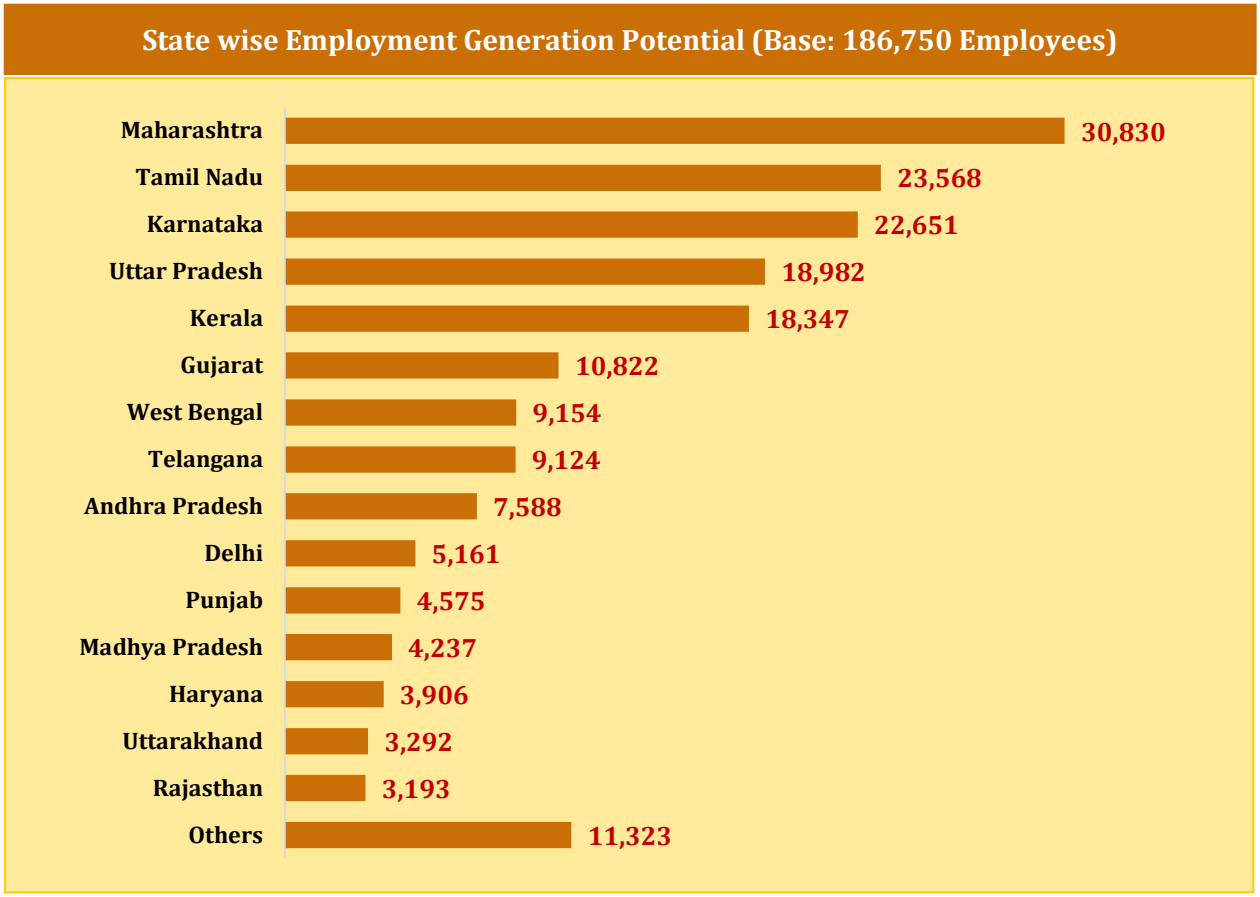


Figure 27: *State wise Employment Generation Potential*

Source: Feedback Analysis

Top 15 states account to 94% of total employment in the industry

6.7 Existing & Emerging Prominent Job Roles Which Requires Skilling

Bread & Bakery is one of the key sub-sectors currently focused by NSDC / FICSI where there are specific programs already available. Following are the specific existing and emerging prominent job roles that will create employment opportunities in bread & bakery products Sub-sector in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various	**A Helper / Floor Cleaner / Loader & Unloader must be able to:**	✓	✓	✓	

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
		labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	• Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.				
Oven Operator or Baking Equipme nt Operator	4	An Oven Operator is responsible for operating bakery industrial ovens at commercial establishments. The individual is also responsible for carrying out minor repair and maintenance of the oven.	**An Over Operator must be able to:** • Load and unload the oven with the bakery products. • Monitor gauges, dials, or other indicators to ensure oven works as expected. • Regulate the oven temperature according to the product being baked. • Alter the position of baking trays in the oven during the baking process for the optimum heat distribution. **An Over Operator must know and understand:**	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
			• How to operate a variety of industrial bakery ovens. • Appropriate temperature required for baking a variety of bakery products. • How to perform general troubleshooting of a variety of industrial bakery ovens.				
Bread Slice Machine Operator	4	A Bread Slicer Operator is responsible for slicing the baked bread. The individual is also responsible for shifting the sliced breads for further packaging.	**A Bread Slicer Operator must be able to:** • Operate the slice machine with ease and to slice the with uniform size. • Clean the slicer machine frequently to avoid any damage due to crumbs. • Handle the sliced bread from the slicer machine to packaging point without any wastage. **An Over Operator must know and understand:** • How to operate a variety of slicer machines (Varies by type of breads / cake loafs). • How to perform general troubleshooting of a slicer machine.	✓	✓		
Ingredie nts Process Mixers Operator s	4	An Ingredients Process Mixer Operator is responsible for mixing the dough and other ingredients and prepare for baking	**An Ingredients Process Mixer Operator must be able to:** • Operate the mixer (Machine) with ease and to mix all the ingredients to make a	✓	✓	✓	

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		the bread and bakery products.	final dough for further baking or processing. • Measure the list of ingredients as per the product requirement. • Clean the mixer after every batch to avoid any contamination. **An Over Operator must know and understand:** • The measurement and list of ingredients required for the product baking				
Flow Wrapping / Flow-Pack Machine Operator	4	A Flow Wrapping / Flow-Pack Machine Operator is responsible for packing food items using the relevant packaging equipment. The individual is also responsible for maintaining the record of packing operations and carry out regular repair and maintenance of the packaging equipment.	**A Flow Wrapping / Flow-Pack Machine Operator must be able to:** • Operate the packing equipment to pack and seal the food products as per the standard procedure. • Label the packed food products. • Maintain the packaging equipment. **A Flow Wrapping / Flow-Pack Machine Operator must know and understand:** • Applicable food safety and packaging standards. • How to operate and maintain the relevant packaging equipment.		✓	✓	✓
Bakery Processing Plant Supervisor	5	A Bakery Processing Plant Supervisor is responsible for supervising and coordinating the activities of plant	**A Bakery Processing Plant Supervisor must be able to:** • Arrange the required resources for the	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
		workers engaged in various activities such as mixing, dividing, moulding, baking, slicing, etc. The individual is responsible for ensuring adherence to the applicable food safety, health, and safety standards.	smooth operation of the processing plant. • Manage the inventory and review the accounting records. • Train and supervise a team of plant workers. • Inspect the plant equipment and systems regularly to detect any malfunctions and take appropriate preventive or remedial action. **A Bakery Processing Plant Supervisor must know and understand:** • Inventory management and applicable accounting practices. • How to train and manage a team of workers. • Various tools, equipment and machineries used in a processing plant, common issues encountered with them and their basic troubleshooting.				
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
			compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data				
R&D Manager	6	A R&D Manager is responsible for research, planning, and overseeing the development of new products.	**A R&D Manager must be able to:** • Conduct research on new product development. • Innovate new health-oriented Bakery products based on research. • Oversee the development of new products as envisaged. **An R&D Executive must know and understand:** • The Global trends on new products and the consumer trend. • Industry standards and applicable regulations with respect to the		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			development of new products. • The process of research, planning, and implementing new programs and protocols				
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.	✓	✓	✓	✓

Table 21: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

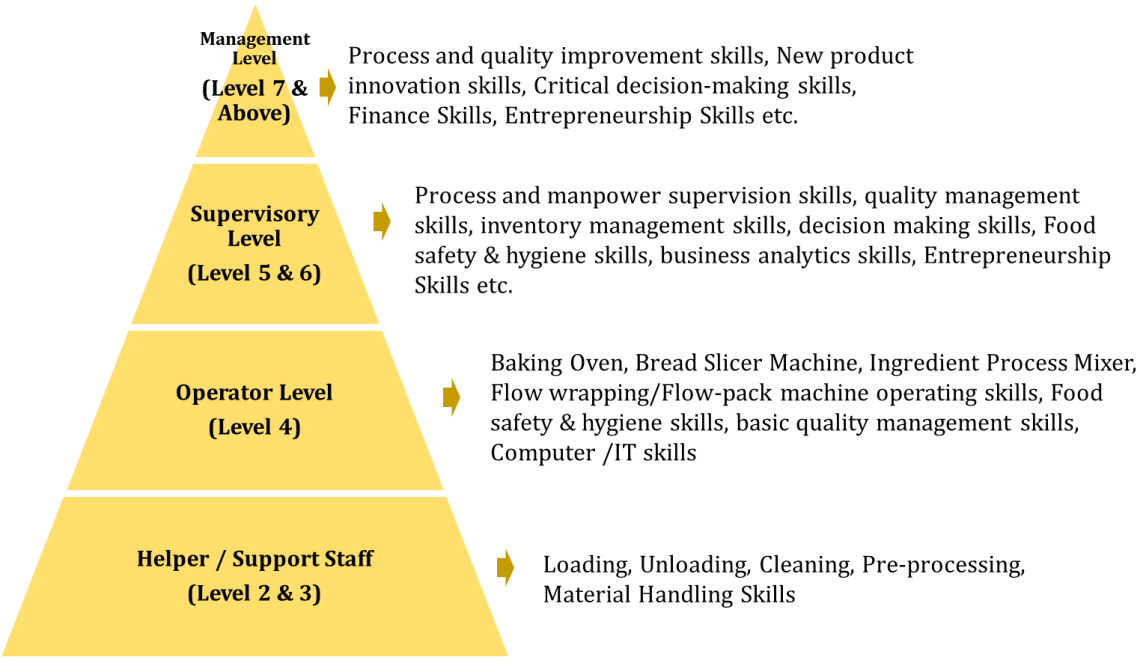


Figure 28: *Skill Sets required across multiple levels in the sector*

6.8 Expectations from the Industry Stakeholders

Considering the nature of the industry which is highly fragmented with more than 3,00,000 bakeries which is growing every year, the sector has huge potential for training. Also, Bread & bakery is one of the Key sectors for FICSI which has created around 5 QPs already for the sector.

Unlike other industries, candidates trained under Bread & Bakery programs are professional bakers work in either of the following venues;

- Wholesale and retail bakeries
- Catering companies
- Supermarkets
- Restaurants
- Hotels and resorts
- Cafeterias
- Factories
- Ingredient Manufacturing
- Techno Marketing of Ingredients and Bakery Products

In addition, there is huge requirement of R&D Professional in Bakery Industry.

Also, it is to be noted that more 30,000 Indian Bakery Chefs/Technologists are working in abroad. There are lots of opportunities of Indian bakers in international market.

Training the Candidates on Multi Functions

- Multiskilling is the key by introducing them to multiple skills required by the industry so that the employee can be fill in across any functions.
- Also, at the minimum, people need to teach the basics of milling and further processing which will develop a much-rounded skill set in bakery.

Specializations needs to be created in the formal training curriculum

- Currently there are no specialization offered to students to choose their interest area / career in specific sub-sectors within food processing industry.
- It is expected that creating such specializations will create more customized curriculum, training and practical knowledge for the students and they will be job ready when they join any processing company.

Visibility of Training Institutes offering technicians

- With the limited awareness of the institutes offering bread and bakery product training programs, it is expected that more institutes to be operated across states.
- Introduction of more online training programs to make skilling available at a national level

Food Safety related programs

- The food safety may be the first and foremost concept for the Government to give training to each and every person.
- It becomes extremely important to sensitize employees on the importance of maintaining stringent hygiene standards. This is one area where the government needs to lay a lot of emphasis on.

Chapter 7: Sub-Sectoral Analysis – Dairy Products

7.1 Market summary

India is the largest producer of milk in the world with almost 18.5 per cent of the world production. The organized segment consists of Co-operatives and Private Dairies and the unorganized segment consists of traditional milkmen, vendors, and self-consumption at home. Out of the total milk distributed jointly by the organized and unorganized segments, about 70% is consumed in milk form and the balance is converted into various milk products like milk powder, ghee, butter, cheese, yoghurt, etc. The biggest component of India's dairy market is liquid milk. According to Dairy India (2017), the liquid milk market's share is estimated to be around 58% of the total value. Other products include Semi-Skimmed and Skimmed Milk, Low-Fat Milk, Sweet Yoghurt, Buttermilk, Ice-creams etc. the organised sector currently accounts for 38% and the Govt. is trying to increase the share of organized sector through various interventions. Visionaries and the industry experts perceive the share of organized sector to reach to approx. 50% by FY'30. Due to lockdown, the demand of milk and milk products especially from the Hotel, Restaurants & Catering sector has adversely impacted, thus resulting in sharp fall in sales of these commodities. Overall Exports of Dairy Products have seen a significant drop in FY 20, it is expected to recover in the coming years post the recovery from pandemic. India has seen dramatic shift towards consumption of value-added products such as cheese, yoghurt, UHT (ultra-heat treatment) milk, flavoured milk, and whey. 100% of these products are sold through organized market. The value-added products market is under-penetrated, thus having tremendous scope for growth in the coming years.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	40,835
No. of registered units	2,374
Past Growth rate (CAGR) (FY' 15 – FY' 20)	9.8%
Total Number of Employees (FY' 20)	2,02,240 nos.
Overall Exports (FY'20)	INR 1,982 Crs.
Expected Market ('000 MT) FY' 2030	1,02,000
Future growth rate (FY' 20 – FY' 30)	9.6%
Total Employee Estimation (FY' 30)	4,75,811 nos.
Overall Employment Additions (FY' 20 – FY' 30)	2,73,571 nos.

Table 22: Dairy: Key Industry Indicators

7.2 Present State of the Industry & Future Outlook

India is the largest producer of milk in the world with almost 18.5 per cent of the world production. According to NDDB, India ranks first among the world's milk producing nations, achieving an annual output of 199 mn tonnes[18] during the year FY20 which is approximately 2 times that of the USA, over 5 times of China and over 4 times of Pakistan.

The Indian dairy industry is divided into 2 segments: organized and unorganized. The organized segment consists of Co-operatives and Private Dairies and the unorganized segment consists of traditional milkmen, vendors and self-consumption at home. This study covers only the organised dairy segment in India.

Out of the total milk distributed jointly by the organized and unorganized segments, about 70% is consumed in milk form and the balance is converted into various milk products like milk powder, ghee, butter, cheese, yoghurt, etc.

Key Stakeholders in the Value Chain

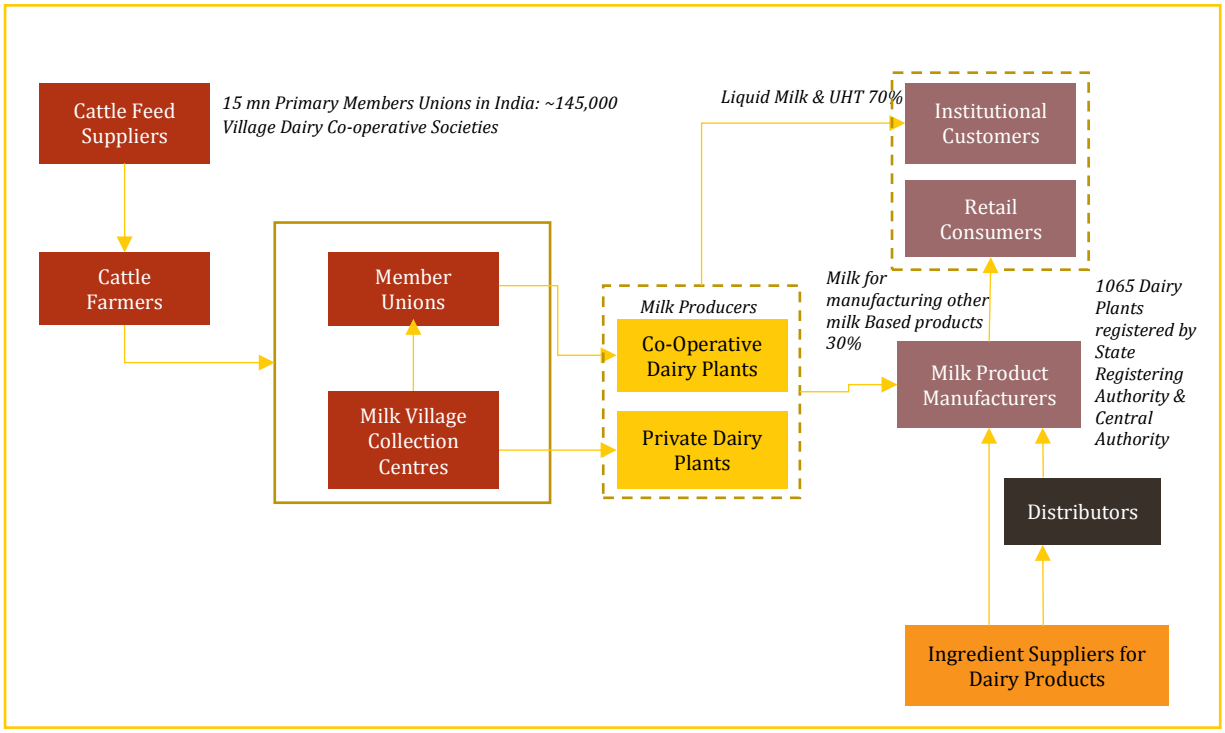


Figure 29: *Value chain of Dairy market in India*

Various milk-based products manufactured commercially in a rural industry are Paneer (Cheese), Dahi (Curd), Ghee etc. Other products include Semi-Skimmed and Skimmed Milk, Low-Fat Milk, Sweet Yoghurt, Buttermilk, Ice-creams etc.

These products are manufactured by low-cost traditional methods and machineries. These kinds of industries are located in the area where abundance quantity of milk is available.

[18] NDDB

Manufacturing Clusters

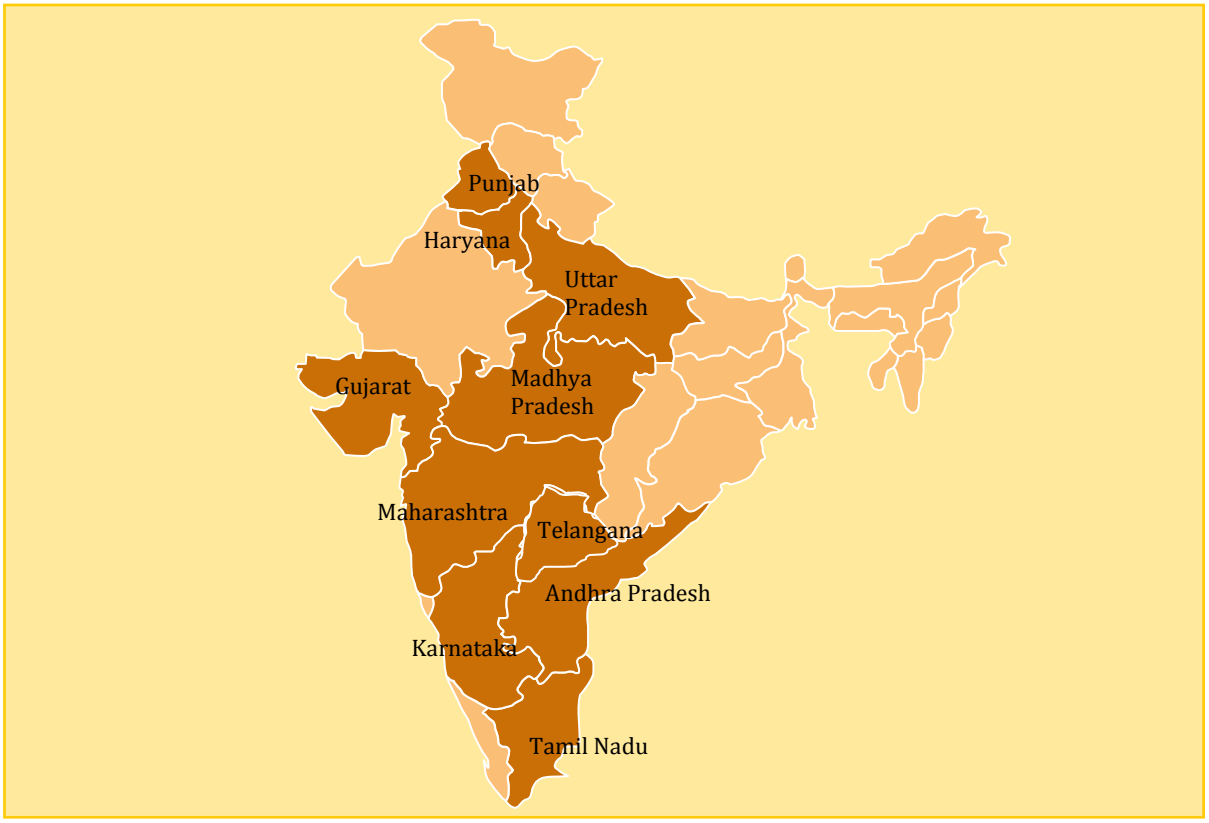


Figure 30: *Manufacturing Clusters*

Top 10 states account to 82% of total employment in the Dairy products industry.

The Indian Dairy market was valued at INR 11,609 Bn growing at a CAGR of 5.6% in the past 5 years.

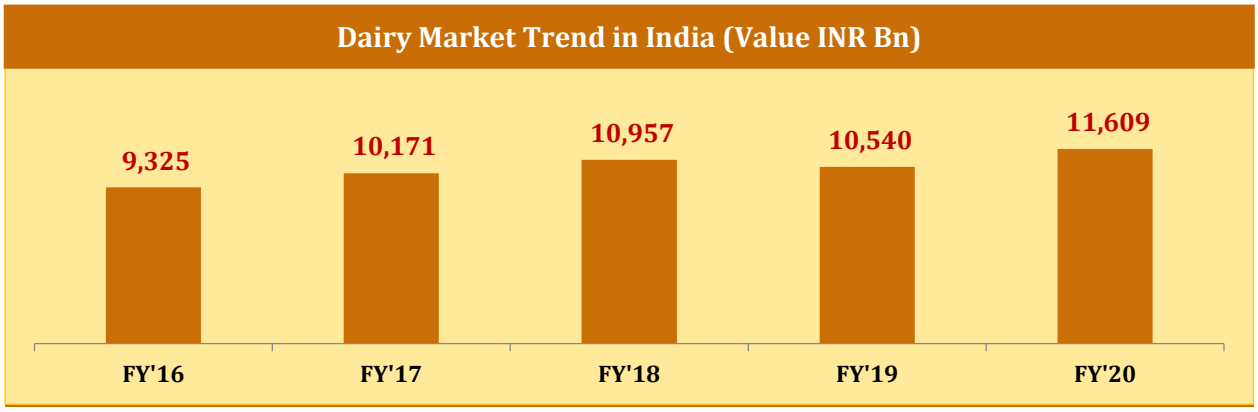


Figure 31: Dairy *Market Trend in India (Value INR Bn)*

Production trend of select Dairy products

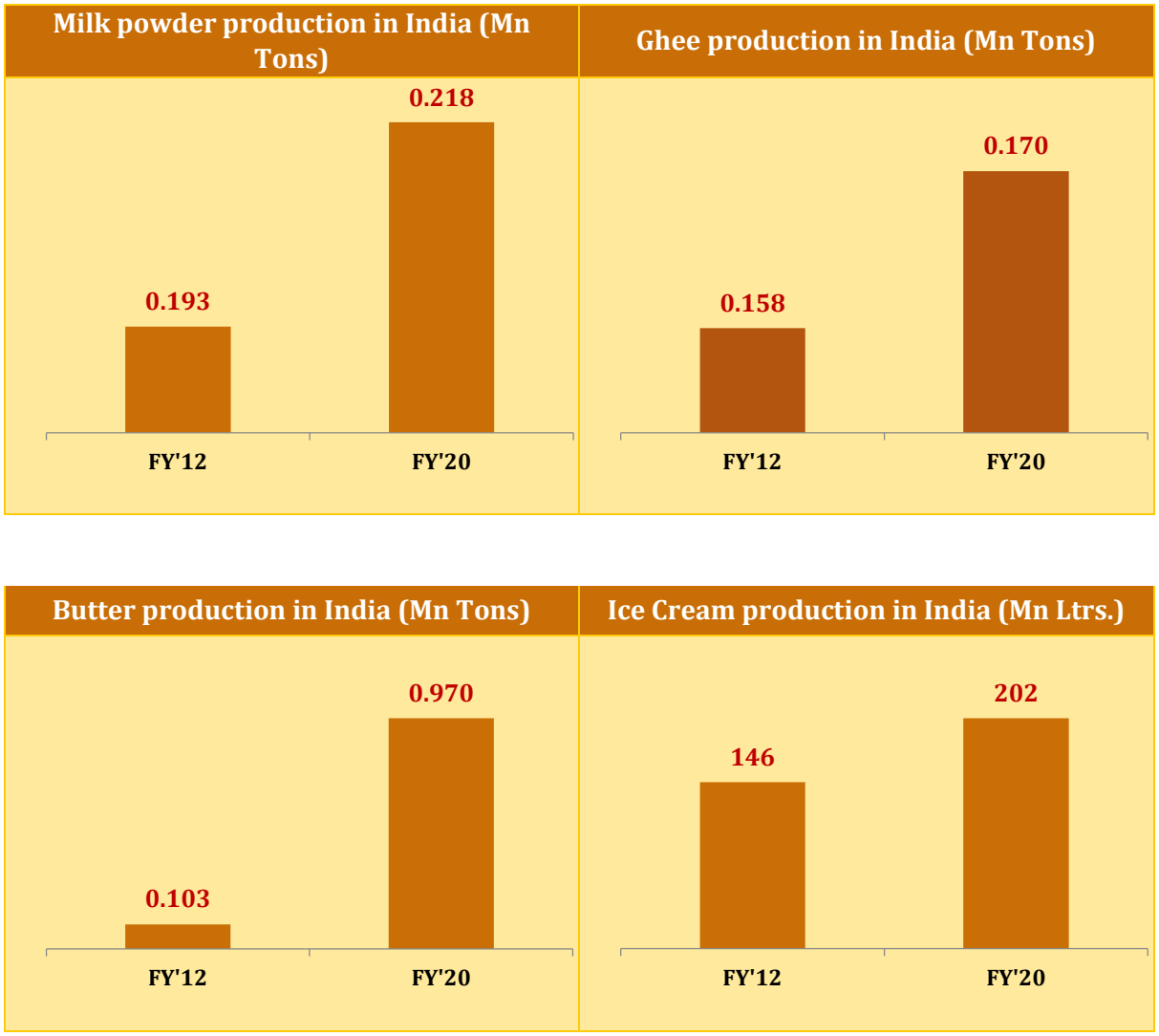


Figure 32: *Production trend of select Dairy products*

Source: Analyst Report – Hatsun Agro Products

The biggest component of India's dairy market is liquid milk. According to Dairy India (2017), the liquid milk market's share is estimated to be around 58% of the total value.

After liquid milk, the biggest segment of the country's dairy market is dairy products such as khoa, chhana and paneer used as base material for a variety of indigenous sweets and preparations, followed by ghee. Much of these products are produced by households or halwais (sweetmeat makers).

Historical Growth of Milk Production

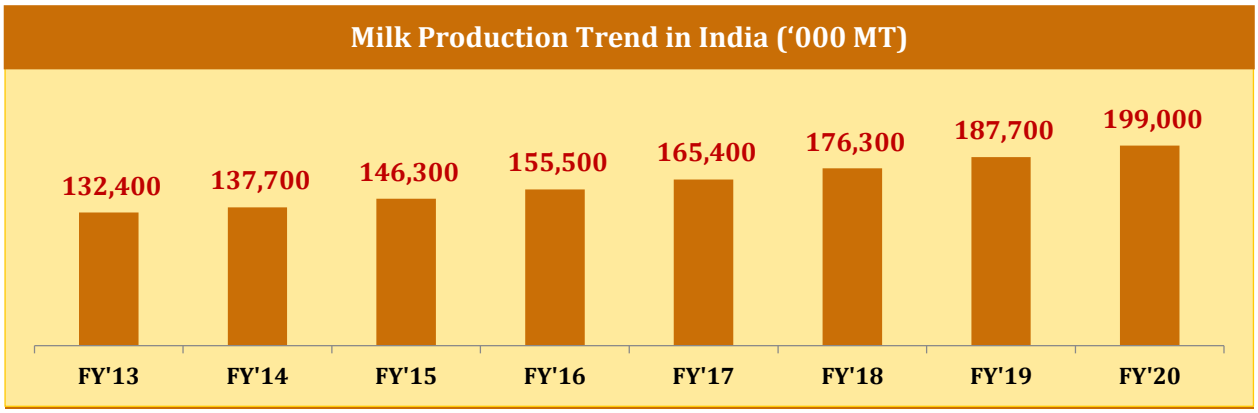


Figure 33: *Milk Production Trend in India ('000 MT)*

Source: till FY'19 NDDB, FY'20 Feedback BOK, Interactions with SMEs

Exports

Overall Exports of Dairy Products have seen a significant drop in FY 20, it is expected to recover in the coming years post the recovery from Pandemic.

Below mentioned chart indicates exports of Skimmed Milk Powder, Butter, Butter Oil, Cheese, Ghee and Butter Milk.

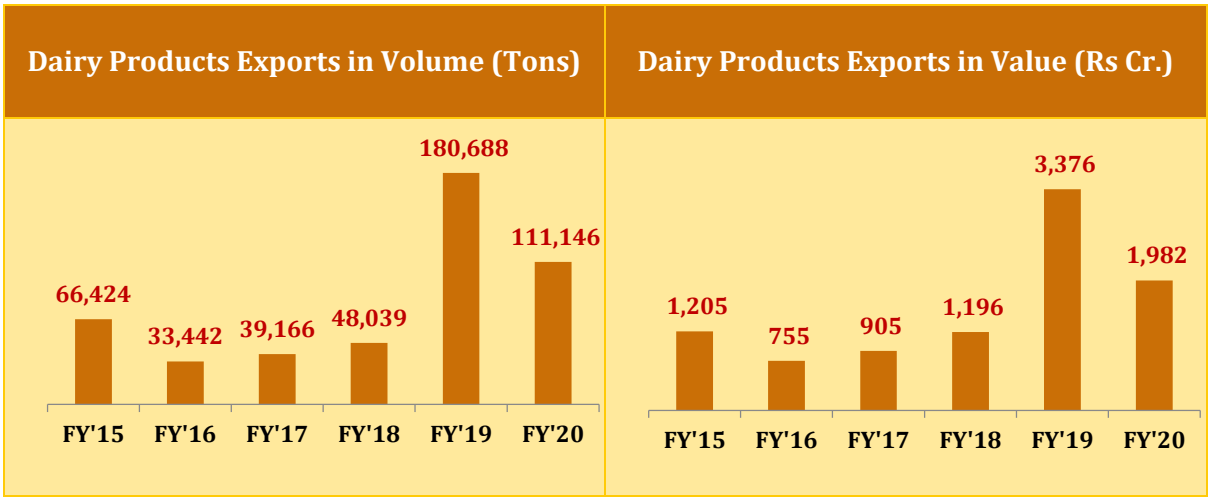


Figure 34: *Export Trends of Dairy Products in Volume (Tons) & Value (Rs. Cr.)*

Source: Ministry of Commerce & Industry (Tradestat)

Support for Exports of Skimmed Milk Powder (SMP)

Due to lockdown to curb the spread of COVID19, the demand of milk and milk products especially from the Hotel, Restaurants & Catering sector has adversely impacted, thus resulting in sharp fall in sales of these commodities. While majority of the co-operative dairies have continued to collect milk from dairy farmers to ensure best possible financial support in spite of lower sales, this has resulted in surplus stock of SMP and butter.

Till July, 2020 India has more than 1.5 Lakh metric tonne of SMP out of which about 50,000 metric tonne of SMP can be exported through support provided by the government by competing in the global trade of SMP[19].

7.3 Present Employment Scenario & Analysis

Category of the Companies by Revenue

Category of the Company	Definition (Revenue Range)	Remarks
Micro Enterprises	< Rs 5 Cr	• Micro enterprises are primarily into milk pasteurization and few products like Paneer and Curd
Small Enterprises	RS 5.1 – 50 Cr	• Small enterprises would typically deal with Milk and other value-added products. Most of the Small enterprises are also do the contract manufacturing for the large private and co-operative units
Medium Enterprises	Rs 50.1 – 250 Cr	• Medium-Sized Enterprises are predominantly into multiple value-added products along with the milk. These enterprises are either co-operative or private enterprises
Large Enterprises	> Rs 250 Cr	• Large Enterprises can further be split into two categories - Very Large Enterprises and Large Enterprises. • Very Large enterprises procure more than 25 LLPD of milk for processing while it is less than 25 LLPD of milk for the Large Enterprises. • Revenue for both the categories are more than Rs. 250 Cr

Table 23: Category of the Companies: By Revenue

7.3.1 Sample Coverage by Categories of Companies & Region

The detailed primary research exercise undertaken by Feedback Consulting for this report involved meeting over 415 companies across India. This also covered various category of players. 75% of these companies were Micro and Small Enterprises and ~83% of these companies were clustered in Northern, Southern and Western region in India.

Category of the Company	Sample Coverage (N)	East	North	West	South
Micro Enterprises	**160**	**17%**	**30%**	**25%**	**28%**
Small Enterprises	**150**	**17%**	**30%**	**25%**	**28%**
Medium Enterprises	**80**	**16%**	**30%**	**25%**	**29%**
Large Enterprises	**25**	**16%**	**32%**	**24%**	**28%**
Total	**415**	**17%**	**30%**	**25%**	**28%**

Table 24: Sample Coverage by Categories of Companies & Region

[19] https://ficci.in/spdocument/23304/Development-Dairy-Sector.pdf

7.3.2 Total No. of Employees

Past Trend of employment in the Dairy Industry

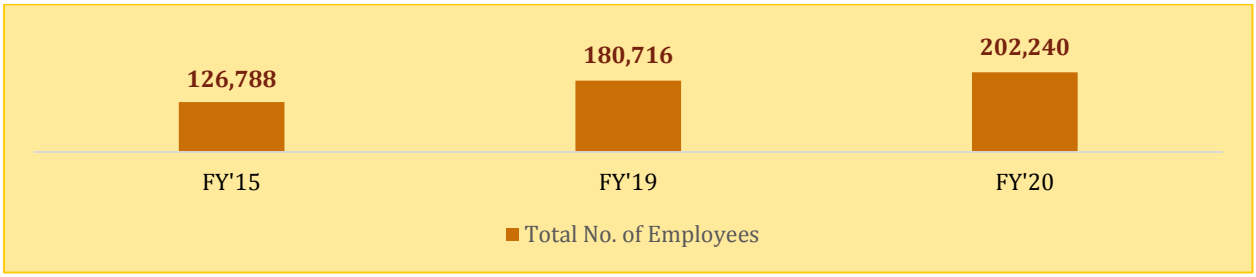


Figure 35: Past Trend of employment in the Dairy Industry

Source: Feedback Analysis

The employment in Dairy industry has grown at a CAGR of 9.8% over the past 5 years and is one of the fast growing employment segments in India.

Share of Employees (FY' 20): Break by Different Category

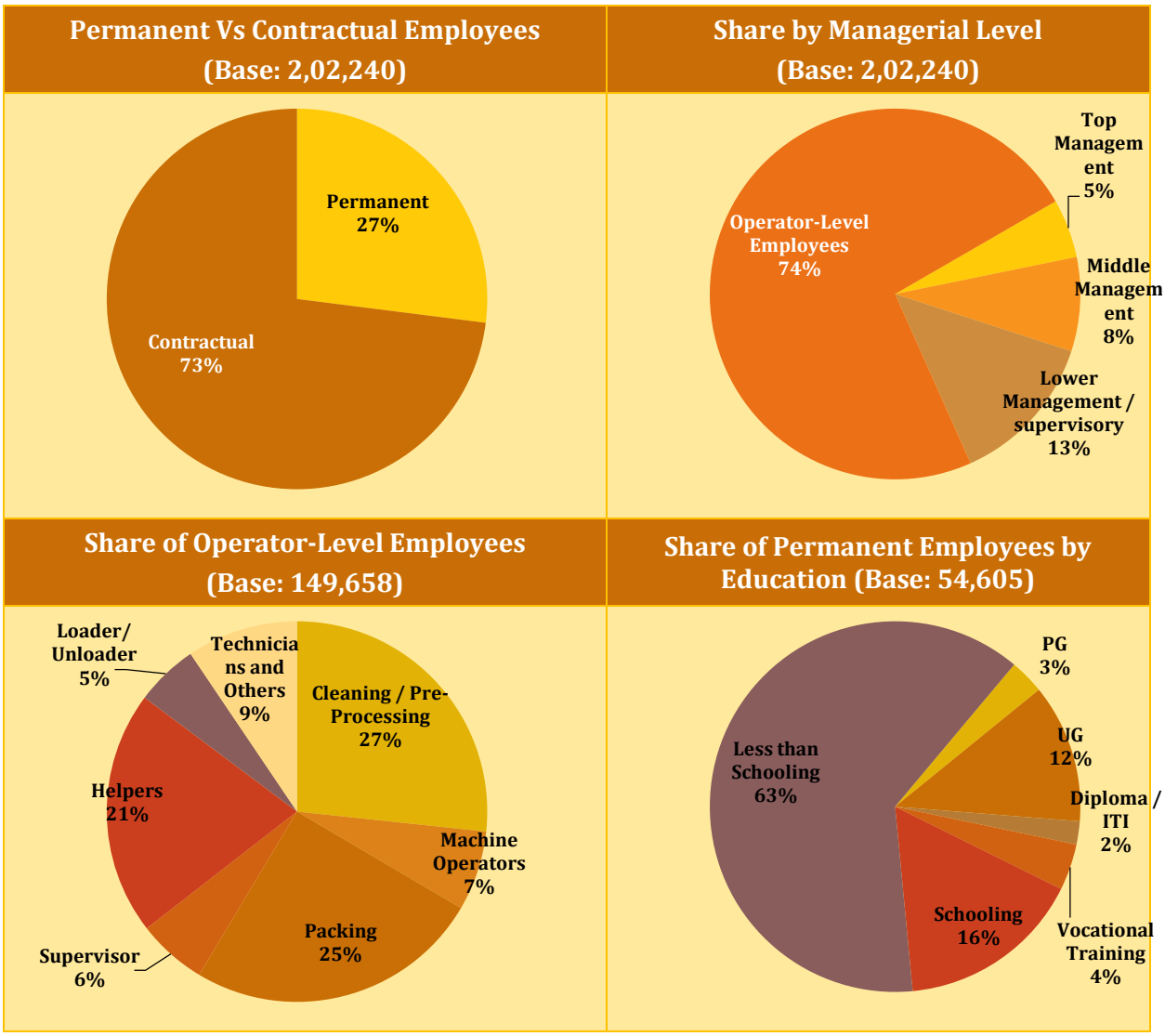


Figure 36: Share of Employees (FY'20): By Different Category

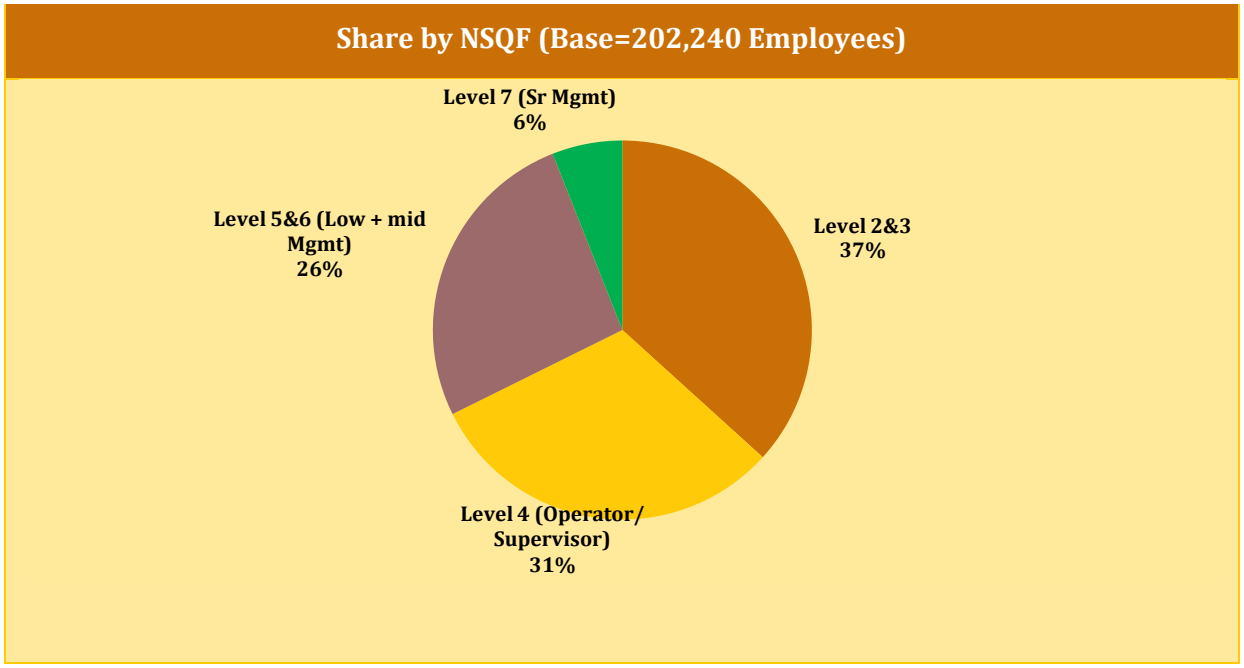


Figure 37: Share of Employees (FY'20): By NSQF levels

Source: Feedback Analysis

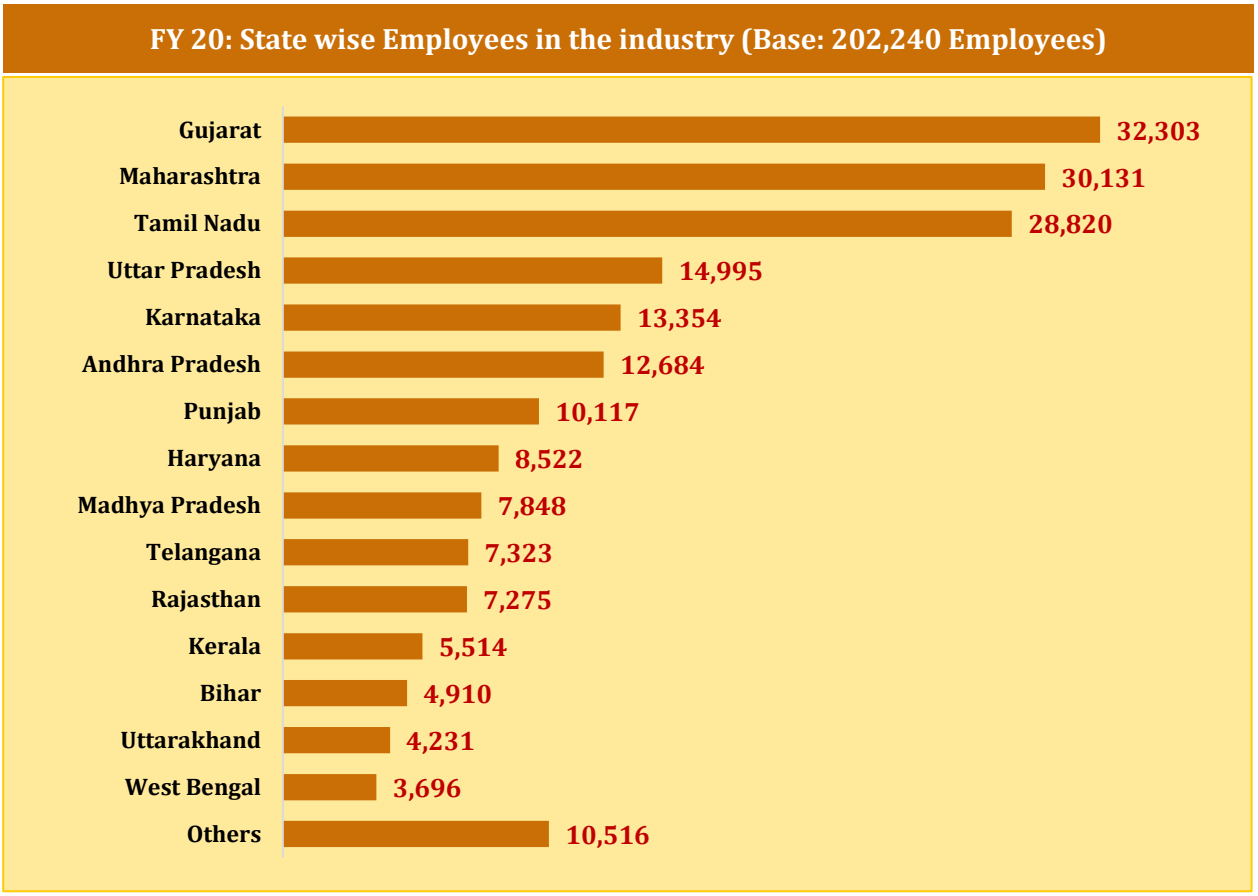


Figure 38: State wise Employees in the Industry (FY'20)

Source: Feedback Analysis

Top 15 states account to 95% of total employment in the industry

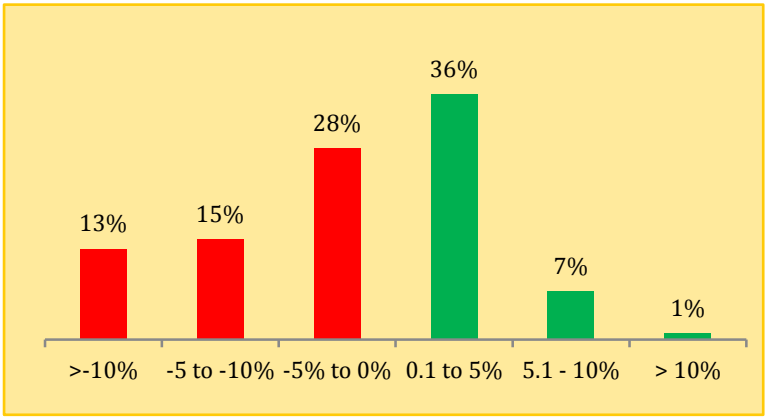
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Veterinary Supervisor	On any given day, a veterinary supervisory could be dealing with feed stock, scheduling laboratory samples or check-up of live stocks, assisting a veterinarian (doctor) whenever required	5			✓	✓
2	Machine Operator (Processing Machinery & Packaging Machinery)	Operate machines to process dairy products (Pasteurization of milk, other dairy value-added products). Also, operate machines to pack. Operators of coolers / cold storage facility at the unit	4	✓	✓	✓	✓
3	Cleaning / Pre-Processing Labours	The pre-processing work includes cleaning of tanks / machine drums after every batch to remove contamination	4	✓	✓	✓	✓
4	Shift Supervisor	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
5	Helpers	Misc. work including cleaning plants, Vehicles, Machinery, etc.	3	✓	✓	✓	✓
6	Loader / Unloader	Material handling, Loading & Unloading products.	3	✓	✓	✓	✓
7	Technician	Machine maintenance	4	✓	✓	✓	✓
8	Packer	Packing the products based on specifications	3		✓	✓	✓
9	Accountant / Invoicing Clerk	Managing accounting and day to day transaction entry in the ledger	4		✓	✓	✓
10	Pre-Pack Support Labour	Weigh the product based on specification (specifically for cottage cheese and few dairy products where manual intervention required).	3		✓	✓	✓

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
11	Tanker Lorry Drivers	Drivers transit the raw milk from the collection centers to the plant and transit the finished goods to the retail / channel	4		✓	✓	✓
12	Collection Labour at the Collection Centers	Technician / collection agent at the collection center transfer the raw milk into bulk milk coolers before transiting to the plant	4		✓	✓	✓

Table 25: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

7.3.3 Past Growth of Employees (FY'17 – FY'20)



- >55% of the enterprises have experienced degrowth in their manpower in the past 3 years.
- 36% have indicated that their manpower has grown marginally (up to 5%).

Figure 39: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

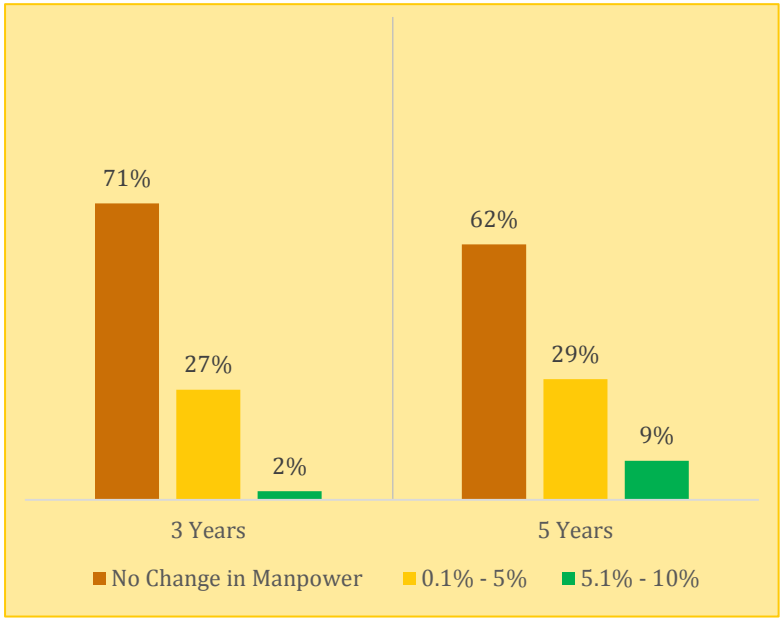
7.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Planning to invest in Internet of Things (IoT) or Automation	37%	9%	36%	80%
Plan to invest on new equipment / New Facility	0%	0%	7%	20%
Plan to enhance the production capacity	26%	12%	21%	80%
Plans to launch new products	0%	0%	14%	0%
Plans to increase exports	0%	21%	0%	0%

Table 26: Future plans of the companies covered

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- <1% in next 3 years (Average)
- 1% – 2% in next 5 years (Average)

Figure 40: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

7.4 Recruitment & Training Practice

Recruitment Practice

Walk-ins are the key source of recruiting candidates across Operational level and Lower level employees. Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal education institutes that offer food technology / food science programs
Middle Management	• Formal education institutes that offer food technology / food science programs
Lower Level Management	• Regional training institutes • Majority of employees in lower-level management are not coming from any education institutes. Most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 27: Recruitment Practice

Training Practice

Overall ~30% of the companies we have covered as part of the sample are providing training across levels when an employee joins the firm (On-the-Job training).

% of Companies offering training

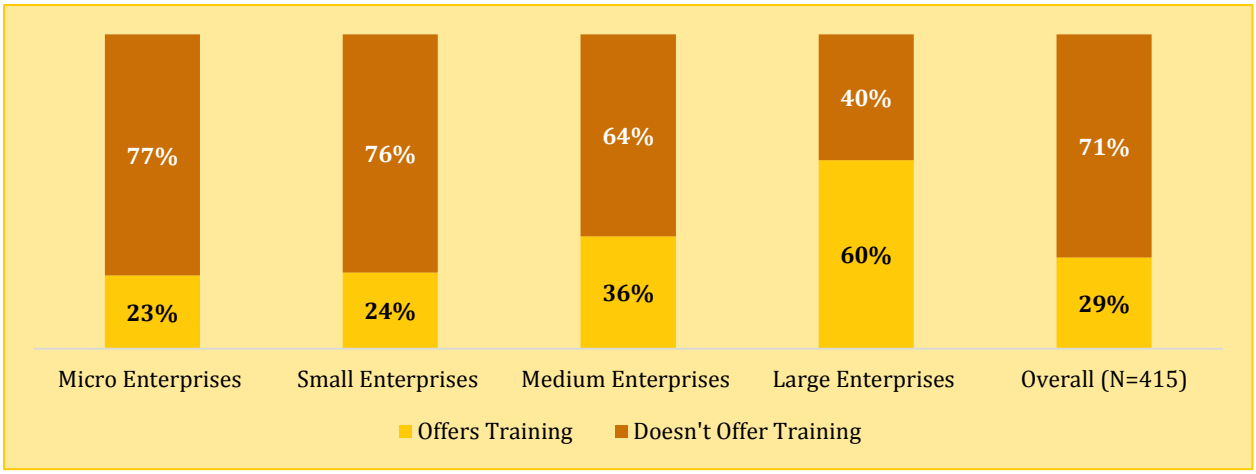


Figure 41: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered (Encountered in Primary Interviews)

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Raw Milk Handling	Milk Collection and initial storage in Bulk Milk Coolers	Collection Labour at the Collection Centers	✓	✓	✓	✓
Product Handling	Detail the Milk and value-added products handling requirements. Hygienic handling of the products and the wastages	Operator Level Employees & Lower-Level Employees	✓	✓	✓	✓
Storage	Storage temperature required at every stage of processing (Raw Material to Finished Products)	Operator Level Employees & Lower-Level Employees			✓	✓
Supervision of product handling activities	Appropriate cooling methods, packing methods, latest technology, equipment operations, etc.	Supervisors / Managers			✓	✓
Operations Management	Training to detail the overall operations, manpower allocation, inspection, etc.	Supervisors / Managers				✓

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Plant Maintenance	Maintenance checklist for equipment (processing and packing)	Operator Level Employees & Lower-Level Employees (Technicians / Machine Operators)				✓
Cleaning	Machine / Drum cleaning; Vehicle tank cleaning before every batch	Operator Level Employees & Lower-Level Employees				✓

Table 28: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

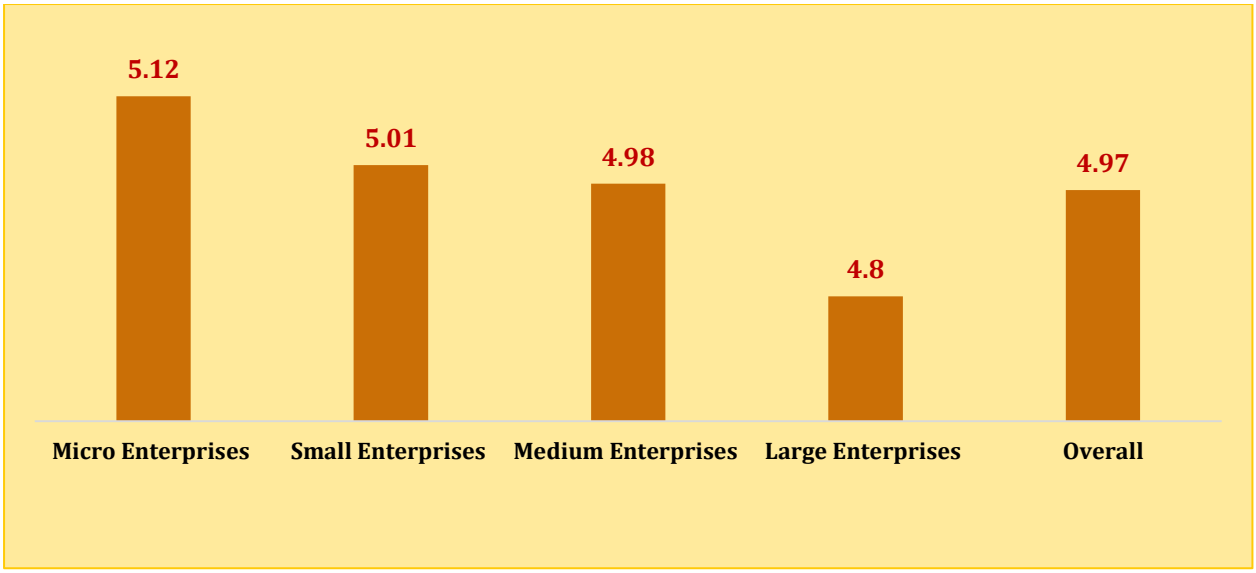


Figure 42: Effectiveness of Training

Source: Feedback Analysis

7.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

Key concerns raised by the dairy product (Pasteurized Milk and Value-Added Products) manufacturers in terms of acquiring the skilled manpower are as follows

Source of Manpower Availability

- According to the processing companies, there are 5+ QPs developed by FICSI for dairy sector. It is to be noted that companies are not aware of the training institutes offering these training programs from where companies can source the semi-skilled / skilled manpower

Limited Institutes offer Formal Education

- There are around 15 institutes offering focused program for Dairy science / technology in India. These institutes are primarily clustered in western region and northern region
- Large and medium enterprises are aware of these formal training institutes offering graduate programs. The expectations are around creating more regional institutes offering formal training for the manpower addition in mid management and top management

Limited knowledge on the Automation among Medium, Small and Micro Companies

- With the technology changes like instrumentation or automation, baring large companies, other dairy processing companies lack knowledge on these emerging technologies

Higher Attrition on Operator Level Employees

- Higher employee attrition among the Medium, Small and Micro enterprises is another challenge where ~45% of employees at the operator level and lower level are leaving the organizations within 2 - 3 years of their joining

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Plant Manager	Mid Management NSQF: 6	• Managerial Skills • Technical Know-how across functions • Interpersonal Skills • Leadership Skills • Training manpower at the lower level or operator level	• Understanding the technology and adaptation to newer technologies • Ability to work with both the processing and packaging equipment • Lack of leadership		✓	✓	✓

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Production Manager	Mid Management NQSF: 6	• Production planning • Technical details on the product ingredients level (Measurement to the T) • Equipment operations (across functions) • Manpower planning for the shifts • Co-ordinating with the Milk supply from the different collection centers	• Lack of knowledge on equipment maintenance and operations • Hygiene practice on cleaning the equipment / drums (usage of proper materials for cleaning to avoid contamination)	✓	✓	✓	✓
Quality Control	Mid Management NSQF: 5	• Monitoring the Milk quality (Fat content and other parameters) • Ingredient's quality check • Assessing the quality for the finished products	• Unable to maintain the similar quality across batches		✓	✓	✓
Inventory Controller & Transportation Manager	Mid Management NSQF: 5	• To develop inventory management systems, maintain stock levels, and coordinate the logistics of orders and transfers. • To organize the optimized way to bring the raw materials to the plant and supply finished goods to the channel partners	• Knowledge of inventory management software • Analysis of demand and supply (Regional)	✓	✓	✓	✓

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Shift Supervisor / Supervisor	Lower-Level Management NSQF: 5	• Overseeing operations including material handling across functions • Technical Know-how knowledge • Soft skills (Communication; Training efficiency & Leadership) • Equipment operations and maintenance • Manpower planning	• Gaps in leadership/supervision skills leading to efficiency and monitoring issues • Best practices w.r.t material handling to reduce wastage during material handling	✓	✓	✓	✓
Maintenance Officer	Lower-Level Management NSQF: 4	• Knowledge on transformation from analogue to digital business model • Domain Skills	• Lack of update in technology	✓	✓	✓	
Loading / Unloading Labors	Operator Level Employees NSQF: 3	• Materials Handling	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	✓
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygienic awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓		

Table 29: Key job roles and their required skills and skill gaps

7.6 Future Projection – Sector & Employment

Projected growth in Milk production in India

Based on the discussions conducted with the Visionaries and Industry experts, Indian Milk production likely to grow at 6-7% CAGR over next 4 - 5 years. A conservative estimate of approx.

5.5% CAGR has been considered to compute Milk production over next 10 years according to which, Milk production in the Country is likely to reach approx. 340 Mn MT by FY'30.

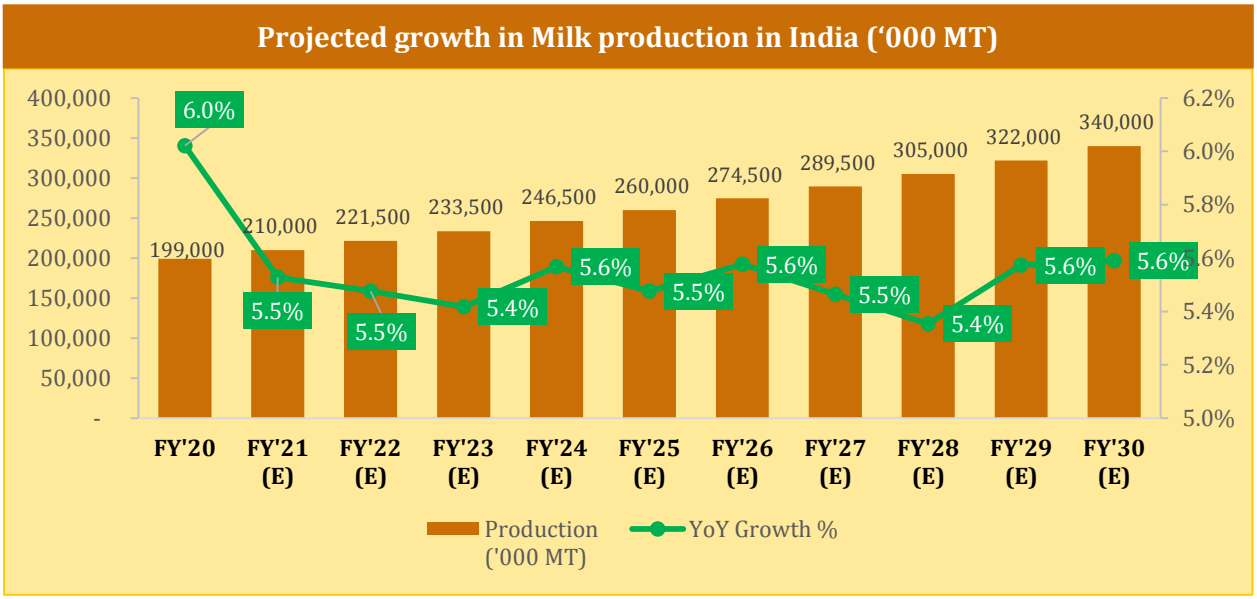


Figure 43: Projected growth in Milk production in India ('000 MT)

Source: Interactions with SMEs & Visionaries

Dairy Processing Capacity Requirement

Year	Production ('000 MT)	Local Consumption ('000 MT)	Marketable Surplus ('000 MT)	Organized Sector ('000 MT)	Unorganized Sector ('000 MT)
FY'15	1,46,300	65,835	80,465	25,600	54,865
FY'19	1,87,700	86,342	1,01,358	36,489	64,869
FY'20 Approx.	1,99,000	91,540	1,07,460	40,835	66,625
CAGR	**6.3%**	**6.8%**	**6.0%**	**9.8%**	**4.0%**
Current Processing Capacity				53,500	
Capacity utilization				76%	

Table 30: Dairy Processing Capacity Requirement

Source: FY 15- Feedback BoK; FY 19 - Budget Speech

COVID-19 pandemic is considered for the future estimates both production and employment.

Future Estimates of Dairy Production & Processing

Year	Production Estimates ('000 MT)	Share of Local Consumption	Local Consumption ('000 MT)	Marketable Surplus ('000 MT)	Share of Organized Sector*	Milk processing by the Organized Sector ('000 MT)	Processing level
FY'20	1,99,000	46%	91,540	1,07,460	38%	40,835	21%
FY'21 (E)	2,10,000	46%	96,600	1,13,400	40%	45,360	22%
FY'22 (E)	2,21,500	45%	99,675	1,21,825	40%	48,730	22%
FY'23 (E)	2,33,500	45%	1,05,075	1,28,425	42%	53,939	23%
FY'24 (E)	2,46,500	45%	1,10,925	1,35,575	42%	56,942	23%
FY'25 (E)	2,60,000	43%	1,11,800	1,48,200	44%	65,208	25%
FY'26 (E)	2,74,500	43%	1,18,035	1,56,465	44%	68,845	25%
FY'27 (E)	2,89,500	42%	1,21,590	1,67,910	46%	77,239	27%
FY'28 (E)	3,05,000	42%	1,28,100	1,76,900	46%	81,374	27%
FY'29 (E)	3,22,000	41%	1,32,020	1,89,980	48%	91,190	28%
FY'30 (E)	3,40,000	40%	1,36,000	2,04,000	50%	102,000	30%

Table 31: Future Estimates of Dairy Production & Processing

**Govt. is trying to increase the share of organized sector through various interventions. Visionaries, industry experts and SMEs feel that share of Organized sector likely to reach to approx. 50% by FY'30.*

Processing capacity and investment required to achieve the above processing levels

Parameter	Unit	Values
Current Processing Capacity	'000 MT	53,500
FY'30 Milk Processing Vol.	'000 MT	1,02,000
Considering 80% capacity utilization, processing capacity required by FY'30	'000 MT	1,27,500
Capacity addition required till FY'30	'000 MT	74,000
Investment Norm*	Rs. Cr. / '000 MT	2.3
Total Investment required	**Rs. Cr.**	**1,66,500**

Table 32: Processing capacity and investment required in the sector

Source: Discussion with Plant & Equipment Manufacturers & SMEs

- There are more than 80 projects in the organized sector with investments worth more than Rs. 10,400 Cr. where the projects are either under implementation or at announcement stage. More than 85% of these projects are financed by Co-operative Sector or Government.
- The Department of Animal Husbandry & Dairying is implementing National Programme for Dairy Development scheme since 2014-15 with the objective to create and strengthen

dairy infrastructure for procurement, processing and marketing of milk and milk products by the State Implementing Agencies (SIAs) i.e., State Cooperative Dairy Federations/ District Cooperative Milk Producers' Union.

- During financial year 2020-21, the Department's focus was primarily on two activities namely (a) Village based milk procurement system and (b) Milk Quality Testing Facilities at Village/District/State Level.
- Government has decided to spend Rs. 15,000 Cr. for a Dairy Infrastructure Fund to build infra for 15 MLD capacity.
- India has seen dramatic shift towards consumption of value-added products such as cheese, yoghurt, UHT (ultra-heat treatment) milk, flavored milk, and whey. 100% of these products are sold through organized market. The value-added products market is under-penetrated, thus having tremendous scope for growth in the coming years.

Select ongoing and upcoming projects in Dairy processing industry in India

SL #	Company Name	Project Name	Project Location	Project Type	Cost (INR Cr)
1	Gujarat Co-op. Milk Mktg. Fedn. Ltd.	Amul Milk Production Capacity Expansion Project	NCT of Delhi	Expansion	2800
2	Pradeshik Co-op. Dairy Federation Ltd.	Lucknow Multi Product Dairy Plant Project	Lucknow, Uttar Pradesh	New Unit	650
3	Banaskantha District Co-op. Milk Producers' Union Ltd.	Raiya Milk Processing Plant Project	Banas Kantha, Gujarat	New Unit	600
4	Gujarat Co-op. Milk Mktg. Fedn. Ltd.	Rajkot (Saurashtra Region) Dairy Plant Project	Rajkot, Gujarat	New Unit	500
5	Gujarat Co-op. Milk Mktg. Fedn. Ltd.	Gandhinagar Milk Powder Plant Project	Gandhinagar, Gujarat	New Unit	450
6	Andhra Pradesh Dairy Devp. Co-op. Fedn. Ltd.	Kondapavuluru Mega Dairy Plant Project	Krishna, Andhra Pradesh	New Unit	362
7	Ahmedabad District Co-op. Milk Producers' Union Ltd.	Ahmadabad Dairy and Cattle Feed Plant Project	Ahmedabad, Gujarat	New Unit	350
8	Hatsun Agro Products Ltd.	Govindapur Ice Cream Manufacturing Plant Project	Sangareddy, Telangana	New Unit	311
9	Ajmer Zila Dugdh Utpadak Sahakari Sangh Ltd.	Ajmer Milk Processing Plant Project	Ajmer, Rajasthan	New Unit	253
10	Gujarat Co-op. Milk Mktg. Fedn. Ltd.	Odisha Dairy Plant Project	Odisha	New Unit	250
11	Kaira District Co-op. Milk Producers' Union Ltd.	Kolkata Dairy Plant Project	Kolkata, West Bengal	New Unit	250

Table 33: Select ongoing and upcoming projects in Dairy processing industry in India

Source: CMIE & Projects Today

FY'20 employment estimation in Dairy processing industry in India

Company Category#	Average no. of Employees	FY'20 Total No. of Employees in Dairy Processing	Share in Milk Processing*	FY'20 Processing ('000 MT)	Annual Milk Processing / Employee (MT)
Large Enterprises	900	90,000	65%	26,543	295
Medium Enterprises	100	75,000	25%	10,209	136
Small Enterprises	50	27,500	8%	3,267	119
Micro Enterprises	10	9,740	2%	817	84
Total		**202,240**	**100%**	**40,835**	**202**

Table 34: FY'20 employment estimation in Dairy processing industry in India

** Based on discussion with the processing plants and SMEs*

**Large Enterprises can further be split into two categories - Very Large Enterprises and Large Enterprises. Very Large enterprises procure more than 25 LLPD of milk for processing while it is less than 25 LLPD of milk for the Large Enterprises. Revenue for both the categories are more than Rs. 250 Cr. Revenue for the other three categories are as follows - Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.*

Future employment projection in Dairy processing industry in India

Company Category	FY'30 share in Processing*	FY'30 Processing ('000 MT)	Annual Milk Processing / Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	65%	66,300	324	204,371	114,371
Medium Enterprises	25%	25,500	143	178,419	103,419
Small Enterprises	8%	8,160	119	68,691	41,191
Micro Enterprises	2%	2,040	84	24,329	14,589
Total		**102,000**	**214**	**475,811**	**273,571**

Table 35: Future employment projection in Dairy processing industry in India

** as per discussion with the processing plants and SMEs, contribution of various types of companies will undergo some changes and the same has been considered in the calculation*

 # Based on discussions with equipment manufacturers and SMEs, Very large, large and some of the medium enterprises will adopt automation / industry 4.0 in the coming years. As per equipment manufacturers, this may lead to 10% improve in the productivity for large enterprises and average 5% improvement in the productivity for the medium enterprises. It is estimated that small and micro enterprises likely to have current productivity level in future as well. The same has been considered for calculating future employment generation potential.

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category

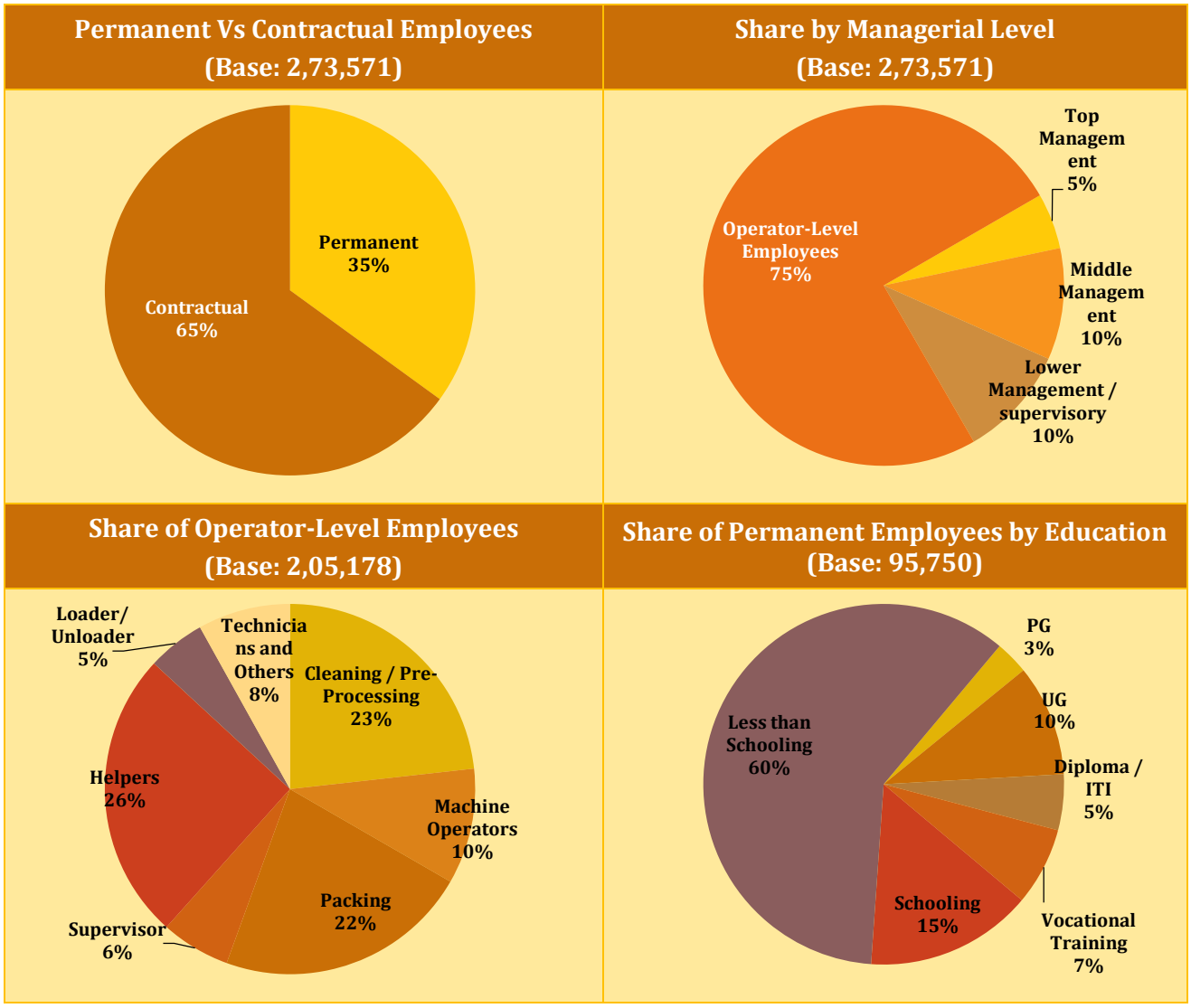


Figure 44: Share of FY'20 - FY'30 Employment Generation potential: By Different Category

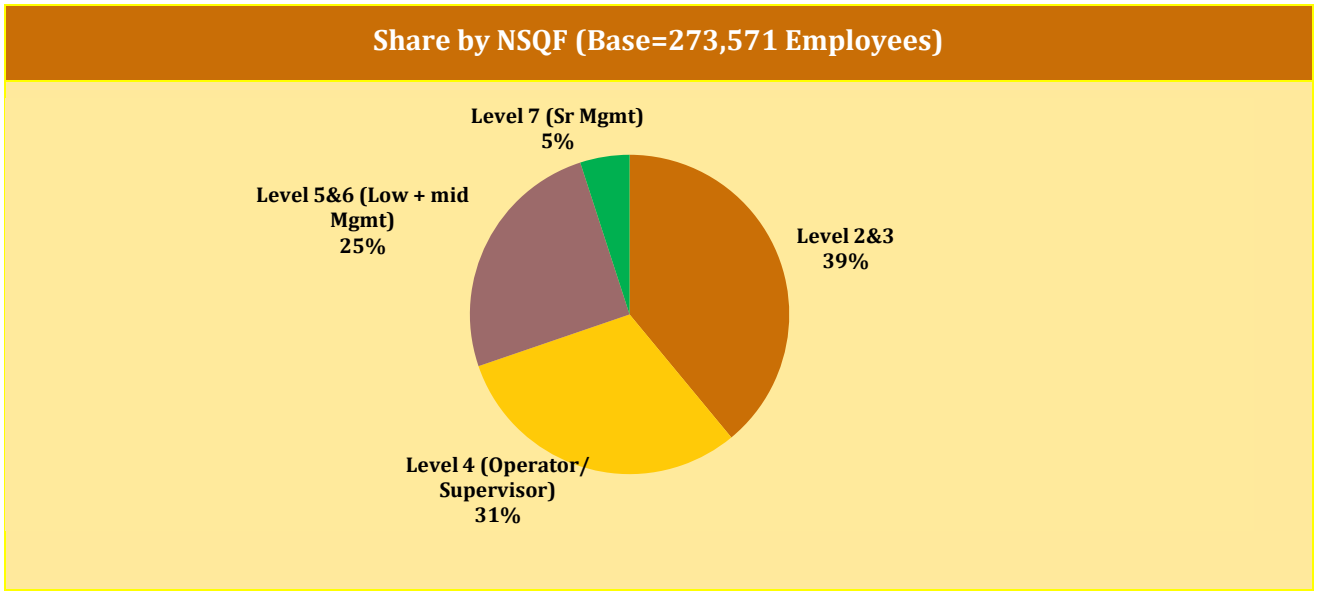


Figure 45: Share of FY'20 - FY'30 Employment Generation potential: By NSQF levels

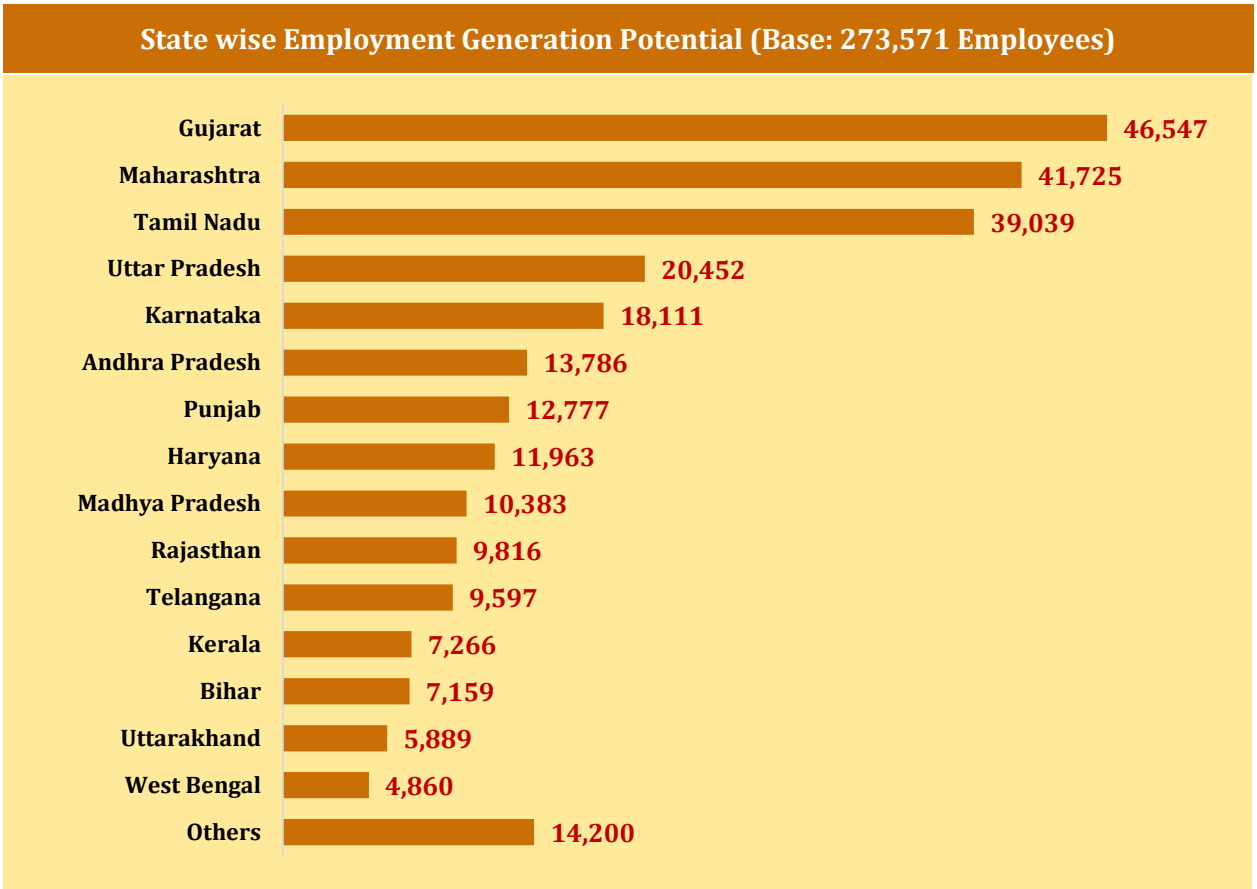


Figure 46: State wise Employment Generation Potential

Source: Feedback Analysis

Top 15 states account to 95% of total employment in the industry

7.7 Existing & Emerging Prominent Job Roles Which Requires Skilling

Following are the specific existing and emerging prominent job roles that will create employment opportunities in dairy Processing Sub-sector in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloadin	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area.	✓	✓	✓	

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		g and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	• Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.				
Machine & Truck Cleaners	3	A Machine & Truck Cleaners is responsible for carrying out cleaning activities under supervision such as cleaning of machineries after every batch of production and cleaning the trucks before loading milk after every trip to avoid contamination	**A Machine & Truck Cleaners must be able to:** • Effectively use the cleaning agents for cleaning the machinery and trucks after every batch and trips respectively. • Effective cleaning of Machinery and Trucks and remove any particles from previous batch to avoid contamination of products. **A Machine & Truck Cleaners must know and understand:** • How to clean the machinery & trucks • How to handle the chemicals and other cleaning agents.	✓	✓	✓	✓
Bulk Milk Cooler Operator	4	A Bulk Milk Cooler Operator is responsible for operating and maintaining bulk milk coolers at milk collection centres.	**A Bulk Milk Cooler Operator must be able to:** • Test the fat content in the raw milk procured from farmers. • Operate and maintain bulk milk coolers. • Follow the applicable food and personal safety standards. **A Bulk Milk Cooler Operator must know and understand:**			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• How to test the fat content in milk. • How to operate and maintain bulk milk coolers. • Applicable health and safety standards				
Milk Pasteurization Plant Operator	4	A Milk Pasteurization Plant Operator is responsible for operating Pasteurizers to process milk. The individual also carries out standard repair and maintenance of the pasteurizers.	**A Milk Pasteurization Plant Operator must be able to:** • Operate the pasteurizers for processing milk. • Store the processed milk products appropriately. • Maintain the record of processing undertaken at the processing plant. **A Milk Pasteurization Plant Operator must know and understand:** • Pasteurization technique. • Equipment Maintenance for any emergency. • Appropriate conditions required for storing the processed dairy products. • Applicable health and safety standards		✓	✓	✓
Paneer Press Machine Operator	4	A Paneer Press Machine Operator is responsible for Pressing the milk solids to make Paneer in required density. The individual also carries out standard maintenance of the Paneer press machines.	**A Paneer Press Machine Operator must be able to:** • Operate the paneer press machines for processing panner or cottage cheese. • Store the processed paneer products appropriately. **A Paneer Press Machine Operator must know and understand:** • Pressing technique for minimal wastage.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
			• Equipment Maintenance for any emergency. • Applicable health and safety standards				
Form Fill Seal Machine Operator	4	A Form Fill Seal Machine Operator is responsible for packing milk and other liquid dairy products by using the "Form Fill Seal Machine".	**A Form Fill Seal Machine Operator must be able to:** • Use the appropriate packaging material according to the type of milk and other liquid dairy products. • Operate the Form Fill Seal Machines with ease. • Follow the applicable food hygiene and safety standards. • Carry out standard repair and maintenance of the machine. **A Form Fill Seal Machine Operator must know and understand:** • How to prepare and use the machine. Applicable food and personal safety standards. • How to maintain the machine. • How to control and minimize leakage • How to control fluctuations in weights of packs • How to minimize wastage of packing material		✓	✓	✓
Container Filling Machine Operator	4	A Container Filling Machine Operator is responsible for dairy products by using the "Container Filling Machine".	**A Container Filling Machine Operator must be able to:** • Use the appropriate packaging material according to the type of dairy products. • Operate the Container Filling Machines with ease. • Follow the applicable food hygiene and safety standards.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Carry out standard repair and maintenance of the machine. **A Container Filling Machine Operator must know and understand:** • How to prepare and use the machine. • Applicable food and personal safety standards. • How to maintain the machine.				
Dairy Products Processing Plant Supervisor	5	A Dairy Products Processing Plant Supervisor is responsible for supervising and coordinating the activities of dairy processing plant workers. The individual is also responsible for monitoring various equipment in the plant and ensuring their effective functioning.	**A Dairy Products Processing Plant Supervisor must be able to:** • Inspect the dairy plant processing plant equipment to ensure correct functioning. • Coordinate with the relevant service providers for the repair and maintenance of processing plant equipment. • Ensure adherence to the applicable quality and safety standards. • Train and supervise a team of processing plant workers including planning daily operations and allocating work. **A Dairy Products Processing Plant Supervisor must know and understand:** • Functioning of various dairy products processing plant equipment. • Effective team management practices. • Applicable food and personal safety standards.	✓	✓	✓	✓
Data Analyst	5	A Data Analyst is responsible for collecting and analysing data regarding milk	**A Data Analyst must be able to:** • Collate data from different stakeholders.			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		production, collection, demand, sales, etc. The individual is also responsible for storing the data safely and preparing the relevant reports to offer actionable insights.	• Analyse the data for actionable insights. • Prepare relevant reports for the stakeholders. **A Data Analyst must know and understand to:** • The process of collecting and analysing relevant data. • Use of the relevant software tools for analysing data and preparing a variety of reports.				
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data			✓	✓
R&D Manager	6	An R&D Manager is responsible for research, planning, and	**An R&D Manager must be able to:**			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		implementing new programs and protocols in their organisation and overseeing the development of new products.	• Conduct research on new product development. • Innovate new health-oriented dairy products based on research. • Oversee the development of new products as envisaged. • Plan and implement new programs and protocols. **An R&D Manager must know and understand:** • The Global trends on new products and the consumer trend. • Industry standards and applicable regulations with respect to the development of new products. • The process of research, planning, and implementing new programs and protocols.				
Inventory Manager	6	An Inventory Manager is responsible for managing the inventory of pasteurised milk and value-added dairy products. This includes ensuring storage of products in the recommended conditions; timely supply to the relevant markets and restocking.	**An Inventory Manager must be able to:** • Ensure the recommended temperature and hygienic conditions for the variety of dairy products. • Implement the FEFO (First Expiry, First Out) mechanism in the outbound shipments. • Ensure adherence to the applicable food safety standards and regulatory requirements in inventory management. **An Inventory Manager must know and understand:** • Appropriate conditions and standards for the storage of a variety of dairy products.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• FEFO (First Expiry, First Out) and other effective inventory management practices.				
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.	✓	✓	✓	✓
Ice Cream Manufacturer	4	An Ice Cream Manufacturer is responsible for developing ice cream recipes and flavours; organising the required ingredients; producing ice cream using the relevant machineries, tools, and equipment; and packing ice cream. The	**An Ice Cream Manufacturer must be able to:** • Develop ice-cream recipes and flavours Organise various ingredients required for producing ice-cream • Produce ice-cream using the relevant production techniques such as churning, mixing, and pasteurizing • Pack the ice-cream using appropriate packaging material Maintain the relevant machinery, tools, and equipment	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
		individual is also responsible for carrying out regular repair and maintenance of the relevant machineries, tools, and equipment.	Follow the applicable health and safety standards **An Ice Cream Manufacturer must know and understand:** • Applicable food safety and hygiene standards • Various ice cream mixes and the ingredients used for producing them • The process of producing ice cream and the appropriate temperature to be maintained while mixing and pasteurising the ingredients • How to operate and maintain the relevant machineries, tools, and equipment				

Table 36: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

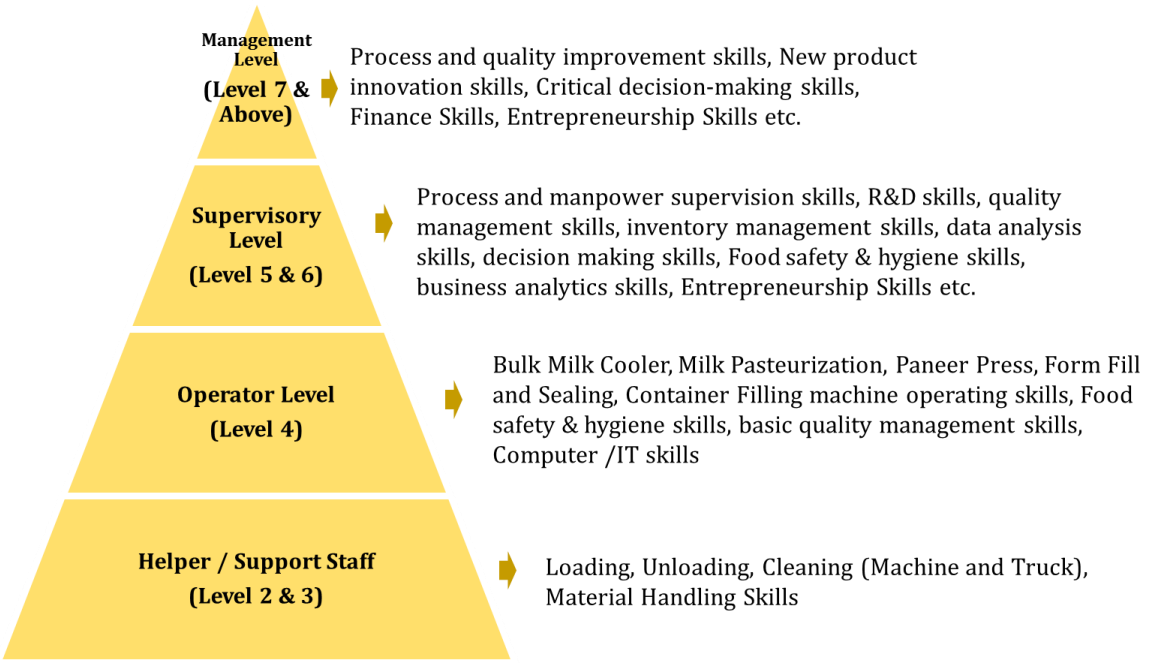


Figure 47: *Skill Sets required across multiple levels in the sector*

7.8 Expectations from the Industry Stakeholders

Formulation of professional council to promote, regulate and standardise Dairy education in India and maintain register of dairy technologists in the pattern of Council of Architecture, Veterinary Council of India etc.

Further, the requirement to have a technical manager with science or technology as qualification as per FSSAI to be partially modified to degree in dairy technology only, as hygienic, sanitary and food safety requirements is more stringent amongst other food processing segments, which is evident from schedule 4 of FSSR 2011 on Licensing & Registration and hygienic, sanitary and food safety topics should be part of their UG degree curriculum.

Formal training institutes are expected to offer intense practical training / internship

- Formal training institutes are expected to change the curriculum based on the changing needs of the industry. Moreover, it is expected that practical training or internship with the dairy plant should be mandatory process for the graduation completion.
- Co-operative societies and Dairy equipment manufacturers like Indian Dairy Machinery Company Ltd., Anand (IDMC) have shown interest in offering internships for the students to experience the actual job requirements during the final year or semester.

Need for Specialized Training Institutes across every state

- With the limited awareness of the institutes offering dairy related vocational training programs, it is expected that more institutes to be operated across states.
- In most of the states, co-operative units had a major share and adopting the latest technology. Institutes can tie-up with the co-operative units to co-train the prospective

manpower in the sector. Specialized programs offering training across functions for the semi-skilled or unskilled employees to be created.

Data Analytics – New jobs on Demand

- Dairy plants and other food processing sector deals with tons of data starting from raw material procurement from different parts of India and imports to retail sales of the end products.
- These data have to be used for the benefit of the company in terms of demand forecasting, raw materials supply forecasting, productivity monitoring and optimize the machine running time, predictive assessment of market, etc.
- Industry would need these skills going forward for their self-growth as well as industry growth

Creating a portal listing of trained manpower

- Dairy plants are facing a major challenge in finding the skilled or semi-skilled employees.
- Companies are expecting that FICSI can list down the students got trained for the QPs generated by FICSI in their portal which can be accessed by the companies.

Chapter 8: Sub-Sectoral Analysis – Fish & Seafood Processing

8.1 Market summary

India is one of the world's largest seafood producers and top exporter of fish & fish products to the major developed markets of the world such as US, Europe, South East Asia, Japan, and the Middle East. India's buoyant seafood industry has emerged as the largest group in agricultural exports of the country. The country holds a huge potential for fisheries with a vast coastline spanning about 8,129 km20 in addition to inland water resources (rivers and canals, reservoirs, ponds, tanks, and brackish water). The processed seafood segment consists of frozen, chilled and shelf-stable seafood among which frozen segment accounts for 70% of the overall processed seafood. Overall processed seafood production market accounts for 0.6% of the overall seafood productions in India and this is mainly because the consumption of processed seafood in India is still at a nascent stage. India has become the world's fastest-growing market for packaged processed fish and seafood which includes frozen and canned products. This market is currently dominated by traditional Indian Fish retailers. Seafood processing is primarily focused on the export markets, however, there has been a recent increase in demand for processed and RTE seafood products in domestic markets.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	26
No. of registered units	591
Past Growth rate (CAGR) (FY' 15 – FY' 20)	16.3%
Total Number of Employees (FY' 20)	94,835 nos.
Overall Exports (FY'20)	INR 46,663 Crs.
Expected Market ('000 MT) FY' 2030	101
Future growth rate (FY' 20 – FY' 30)	14.4%
Total Employee Estimation (FY' 30)	354,036 nos.
Overall Employment Additions (FY' 20 – FY' 30)	259,201 nos.

Table 37: Fish & Seafood Processing: Key Industry Indicators

8.2 Present State of the Industry & Future Outlook

India is one of the world's largest seafood producers and top exporter of fish & fish products to the major developed markets of the world such as US, Europe, South East Asia, Japan, and the Middle East. India accounts for nearly 6% of the global fish production.

The sector contributes 1.1% of India's GDP and 5.2% of the share of agriculture's GDP of India[21]. India's buoyant seafood industry has emerged as the largest group in agricultural exports of the country.

The country holds a huge potential for fisheries with a vast coastline spanning about 8,129 km[22] in addition to inland water resources (rivers and canals, reservoirs, ponds, tanks, and brackish water).

The Indian seafood industry is an important sector of food production, providing nutritional security (such as protein, healthy fats and other nutrients like long-chain omega-3 fatty acids, iodine, vitamin D, and calcium) and deploying about 14 million people across different activities such as harvesting, processing, packaging, and distribution.

Key Stakeholders and Their Roles

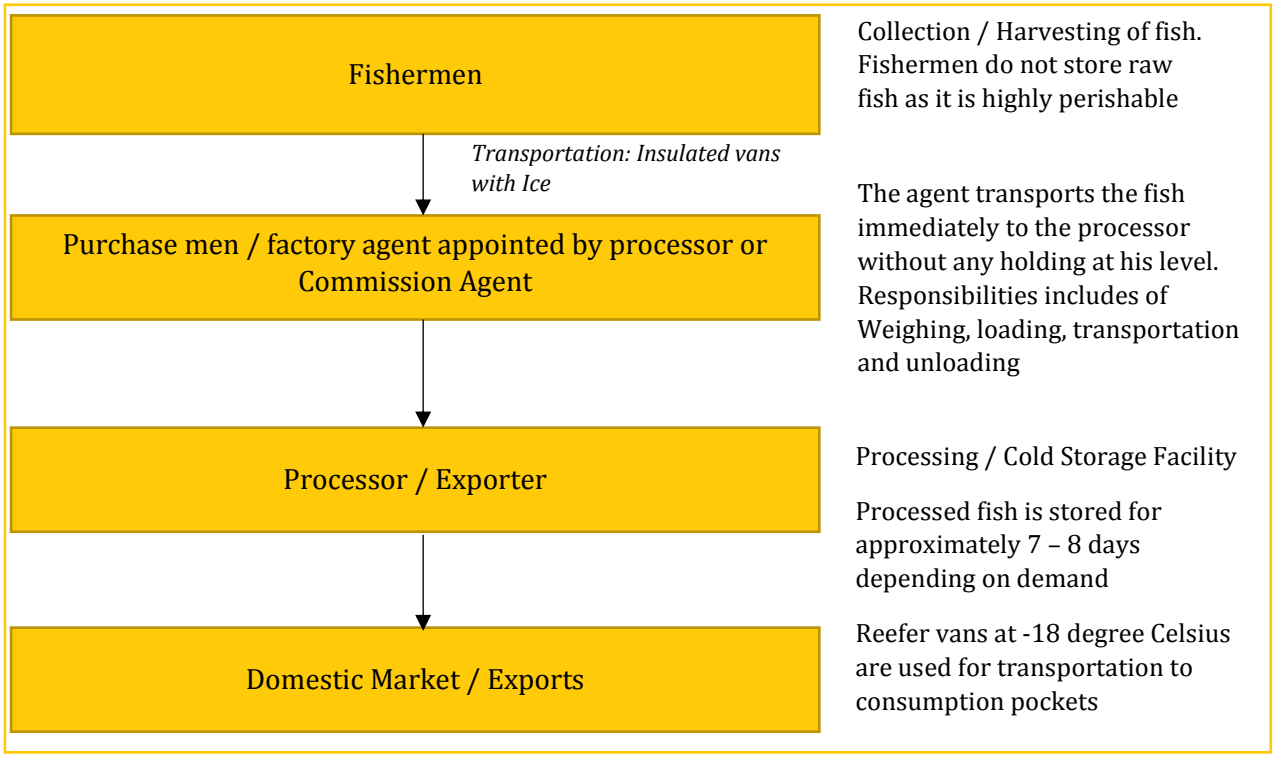


Figure 48: *Key Stakeholders and Their Roles*

The processed seafood segment consists of frozen, chilled and shelf-stable seafood among which frozen segment accounts for 70% of the overall processed seafoods.

Overall processed seafood production market accounts for 0.6% of the overall seafood productions in India and this is mainly because the consumption of processed seafood in India is still at a nascent stage.

India has become the world's fastest-growing market for packaged processed fish and seafood which includes frozen and canned products. This market is currently dominated by traditional

[21] MPEDA
[22] Seafood Exports Association of India

Indian Fish retailers. Seafood processing is done mostly for exports. However, there has been a recent increase in demand for processed and RTE seafood products in domestic markets.

India presently has approximately 600 registered units of seafood Processing Plants having installed capacity to process 26MMT[23].

Marine products are exported through 30 different sea/air/land ports across the country.

Pipavav is the major port with respect to export volumes and Vizag is the major port with respect to export values.

Manufacturing Clusters: Fish & Seafood Processing

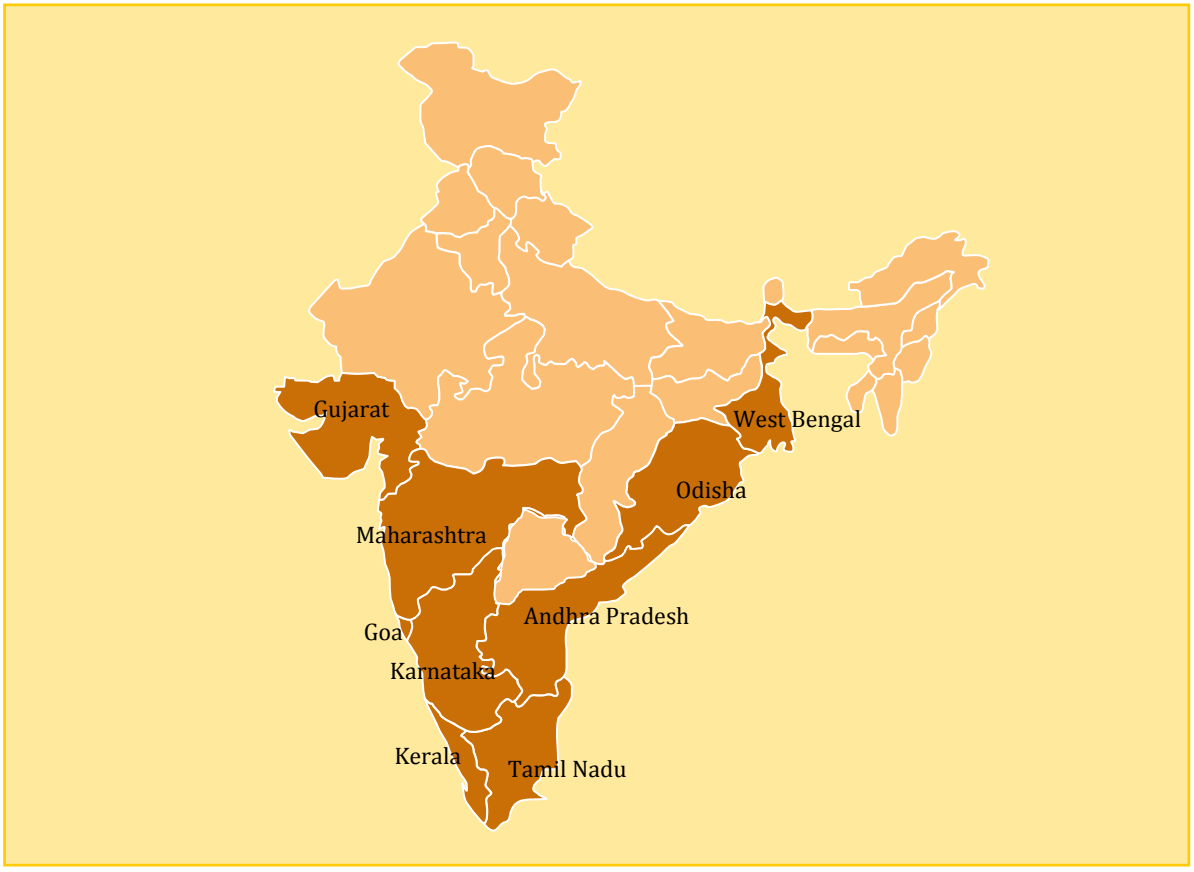


Figure 49: *Manufacturing Clusters*

Top 9 states account to 100% of total employment in the Fish & Seafood Processing industry

[23] MPEDA

No. of Processing Units & Processing Capacity by States

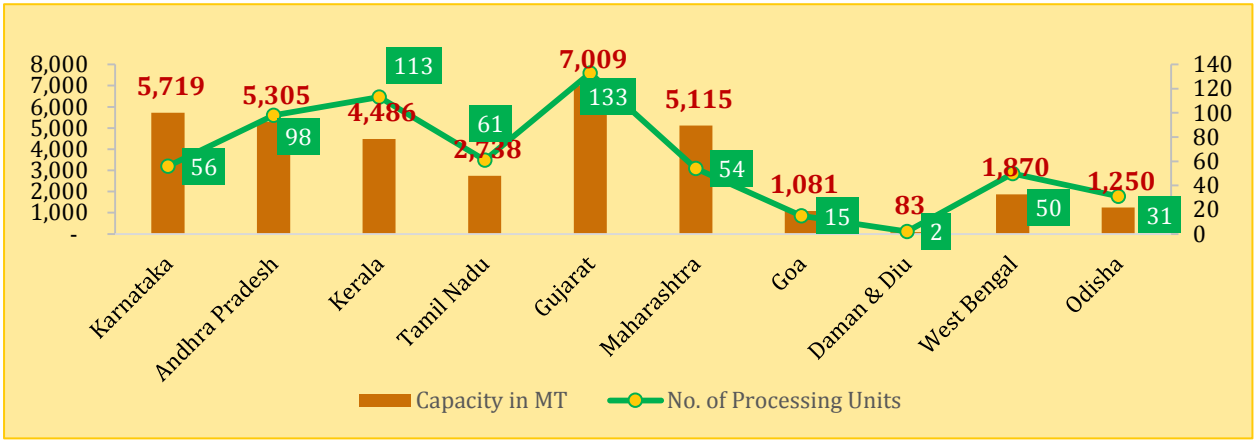


Figure 50: *No. of Processing Units & Processing Capacity by States*

Source: MPEDA

There are 14 offices where these processing units are registered with. Apart from the processing units, there are various storage units, handling centers are registered with the MPEDA /Ministry of Commerce & Industry.

Office	Processing		Cold Storage		Chilled Storage		Dry Fish Storage		Other Storage	
	No	Capacity (MT)	No	Capacity (MT)	No	Capacity (MT)	No	Capacity (MT)	No	Capacity (MT)
RC Vijayawada	10	607	12	15,968	-	-	-	-	-	-
RO Chennai	33	2,347	38	25,744	3	1,448	6	1,218	2	1,246
RO Kochi	110	4,464	148	78,124	1	861	1	4	7	2,588
RO Kolkata	45	1,824	55	16,685	1	310	20	1,272	1	60
RO Mumbai	45	3,841	49	51,008	1	10	5	460	1	540
RO Veraval	95	4,994	105	55,476	-	-	14	1,496	1	200
RO Vizag	18	812	33	21,305	2	1,268	2	3,030	-	-
SRD Ratnagiri	12	1,541	9	8,211	1	706	3	3,110	3	3,110
SRO BBSR	30	1,296	33	19,932	18	11,099	-	-	-	-
SRO Bhimavaram	50	2,900	53	34,785	3	5,366	10	871	3	3,315
SRO Goa	15	1,081	16	7,387	-	-	-	-	2	1,400
SRO Mangalore	55	5,719	33	25,002	-	-	10	7,153	23	13,292
SRO Porbandar	30	1,831	26	19,518	3	877	9	3,731	1	5
SRO Tuticorin	43	1,399	42	22,107	8	783	9	5,080	8	2,502
Total	**591**	**34,657**	**652**	**401,250**	**41**	**22,728**	**89**	**27,425**	**52**	**28,258**

Table 38: *List of Offices & Processing Units*

Market Trend in Fish and Seafood Production in India

Year	Production (Rs. Cr.)	Domestic Sales (Rs. Cr.)	Export (Rs. Cr.)
FY'15	1,01,000	68,000	33,000
FY'16	1,09,520	79,100	30,420
FY'17	1,23,870	85,999	37,871
FY'18	1,40,100	94,993	45,107
FY'19	1,53,939	1,07,350	46,589
FY'20	1,67,963	1,21,300	46,663
CAGR	**10.7%**	**7.2%**	**12.3%**

Table 39: Market Trend in Fish and Seafood Production in India (Rs. Cr.)

Source: MPEDA; Seafood Exporters Association of India

Total Fish and Seafood production in India has been estimated at Rs. 1,67,963 Cr in FY'20. Production has been growing at a CAGR of 10.7% since FY'15. Domestic sales have grown by 12.3% CAGR since FY'15 and currently valued at Rs. 1,21,300 Cr.

On the other hand, Export of Fish & Seafood has grown at 7.2% CAGR since FY'15 and currently valued at Rs. 46,663 Cr. Based on published reports, Domestic Fish and Seafood Sales likely to grow at 13% CAGR and may touch Rs. 1,75,000 Cr. by FY'23.

Estimated No. of Fish & Seafood Processing Units by States[24]

The industry comprises around 590 - 600 processing units as on March 2021 across categories. Around 60% of these companies are either Small or Micro enterprises.

Name of the State	No. of Units	Capacity Range (MT)							
		< 15	15.1 – 25	25.1 - 50	50.1 - 75	75.1 - 100	100.1 - 150	150.1 - 200	> 200
Tamil Nadu	60	33%	16%	28%	16%	-	3%	-	3%
Andhra Pradesh	95	2%	6%	40%	37%	12%	2%	-	1%
Kerala	110	9%	19%	50%	17%	2%	2%	1%	-
West Bengal	45	10%	24%	44%	16%	4%	2%	-	-
Maharashtra	50	2%	2%	20%	20%	17%	22%	13%	4%
Gujarat	130	4%	6%	51%	28%	5%	5%	2%	-
Odisha	30	6%	42%	32%	6%	10%	3%	-	-
Goa	15	-	13%	-	53%	20%	13%	-	-
Karnataka	54	4%	5%	13%	14%	29%	14%	14%	7%

[24] MPEDA

Name of the State	No. of Units	Capacity Range (MT)							
		< 15	15.1 – 25	25.1 - 50	50.1 - 75	75.1 - 100	100.1 - 150	150.1 - 200	> 200
Daman & Diu	2	-	-	100%	-	-	-	-	-
Total	**591**	8%	13%	38%	23%	9%	6%	3%	1%

Table 40: Estimated No. of Fish & Seafood Processing Units by States

Market Trend in Processed Fish and Seafood production in India

Year	Frozen Seafood (Rs. Cr.)	Chilled Seafood (Rs. Cr.)	Shelf Stable Seafood (Rs. Cr.)	Total (Rs. Cr.)	Volume ('000 MT)
FY'15	358	109	52	519	12.2
FY'16	417	127	60	604	14.3
FY'17	492	150	71	713	16.8
FY'18	580	177	83	840	19.8
FY'19	665	193	106	964	22.7
FY'20	752	221	133	1,106	26.1
CAGR	**16.0%**	**15.2%**	**20.7%**	**16.3%**	
FY'20 Share	**68%**	**20%**	**12%**		

Table 41: Market Trend in Processed Fish and Seafood production in India

Source: MPEDA; Seafood Exporters Association of India; Volume for FY'15 - FY'19 has been derived based on FY'20 volume

In FY'20, Processed Fish & Seafood market accounts for only 0.7% of the overall Fish and Seafood production in India and valued at Rs. 1,106 Cr. Within the segment, Frozen Seafood accounts for 68% share while Chilled Seafood and Shelf stable seafood accounts for 20% and 12% share respectively. These three sub-segments are growing at a CAGR of 16.0%, 15.2% and 20.7% CAGR respectively since FY'15.

Market by products

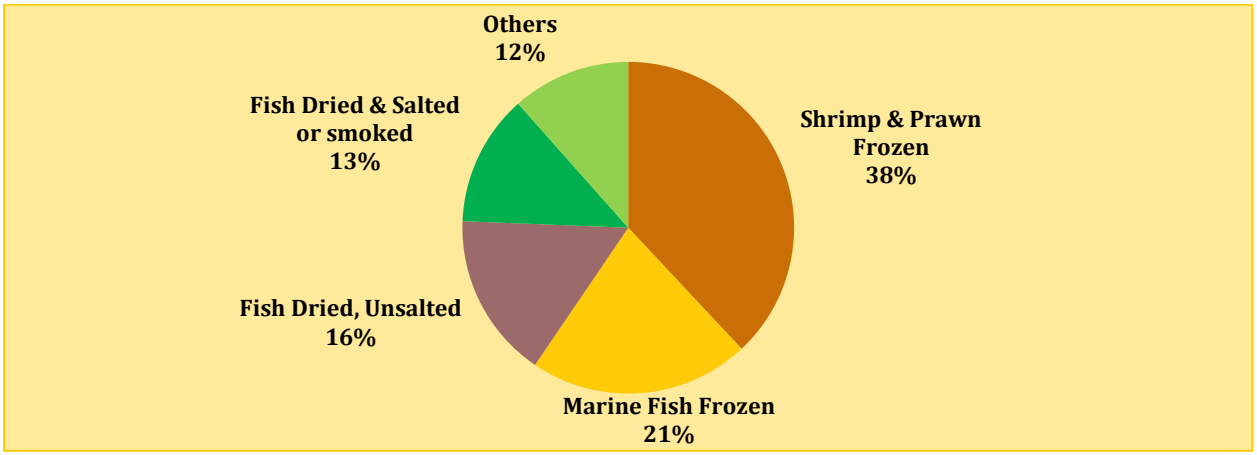


Figure 51: *Market share by Products*

Other Products: Frozen whole cooked lobster, jelly fish, frozen squids, shark fins, etc.

India's domestic consumption as well as the export of marine products have observed tremendous growth in recent years. The changing lifestyle of people and food habits coupled with a rising appetite for healthy food is creating higher demand for processed fish in the urban areas. This, in turn, is creating a way for various players to invest and increase the accessibility of processed products for consumers.

8.3 Present Employment Scenario & Analysis

The detailed primary research exercise undertaken by Feedback Consulting for this report involved meeting over 404 companies across India. This also covered various category of players. 74% of these companies were Micro and Small Enterprises and ~68% of these companies were clustered in Southern and Western region in India.

Generally, the industry is classified based on capacity. However, for uniformity, the industry has been classified based on the revenue guidelines of RBI. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

8.3.1 Sample Coverage by Categories of Companies & Region

Category of the Company	Sample Coverage (N)	East	West	South
Micro Enterprises	**195**	**33%**	**33%**	**34%**
Small Enterprises	**170**	**33%**	**30%**	**37%**
Medium Enterprises	**32**	**29%**	**43%**	**36%**
Large Enterprises	**7**	**30%**	**40%**	**30%**
Total	**404**	**32%**	**34%**	**34%**

Table 42: Sample Coverage by Categories of Companies & Region

The following charts outlines the overall employment scenario across category of companies. Annexure of this report outlines the employment scenario by the category of companies classified above (Micro, Small, Medium & Large Enterprises).

8.3.2 Total No. of Employees

Past Trend of employment in the Fish & Seafood Industry

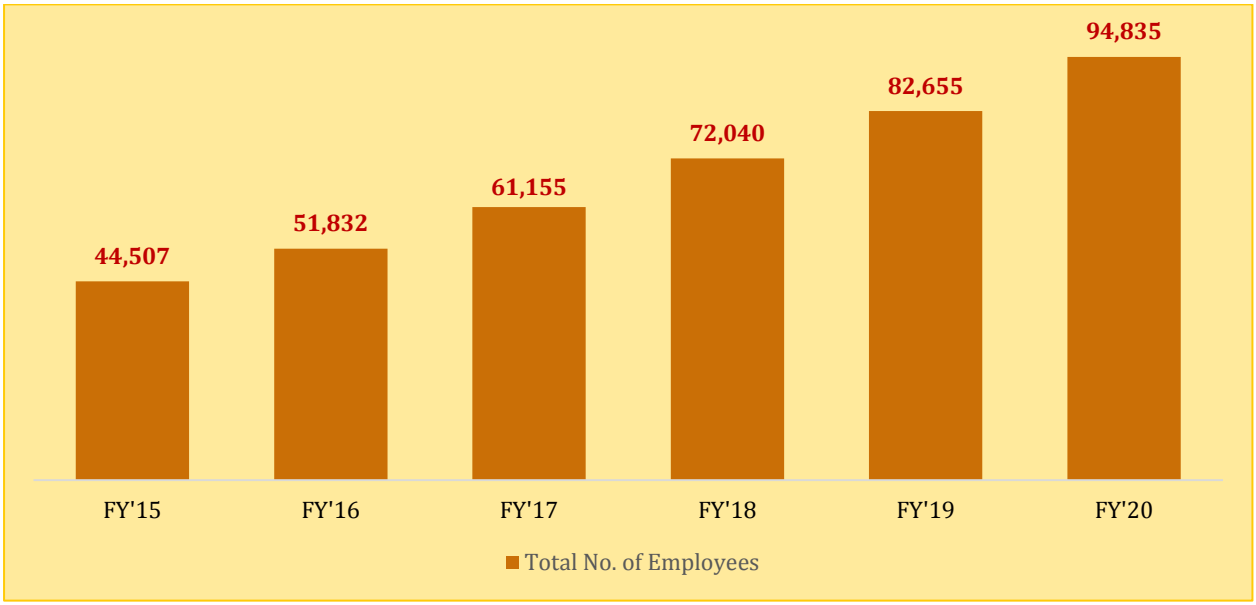
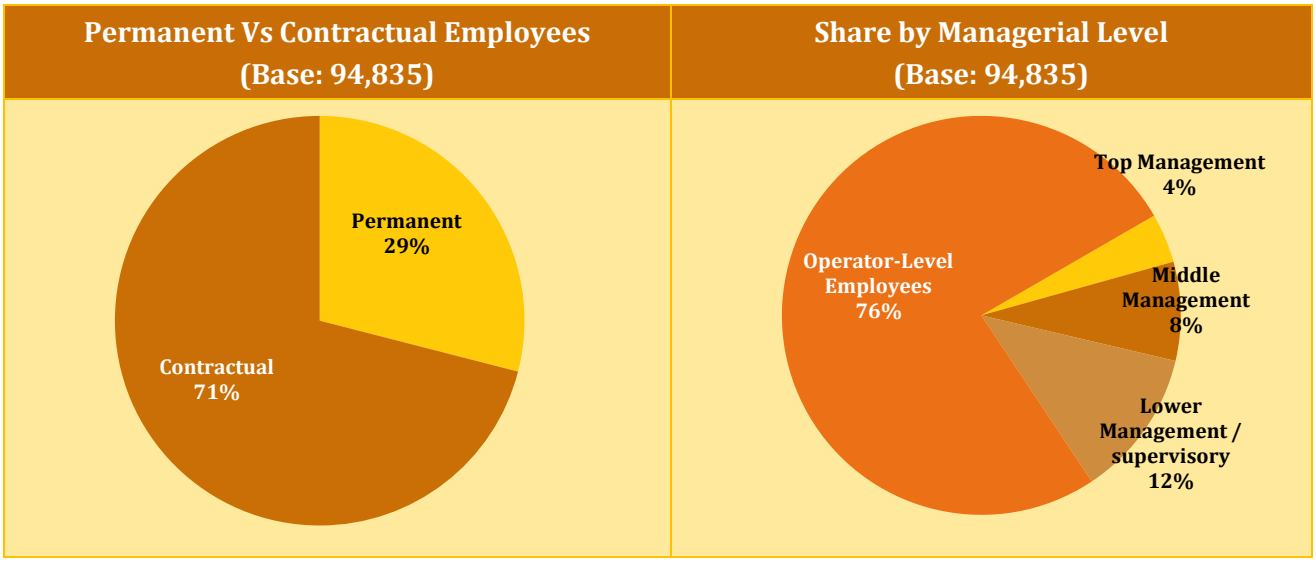


Figure 52: Past Trend of employment in the Fish & Seafood Industry

Source: Feedback Analysis

16% CAGR growth in employment in fisheries segment in India.

Share of Employees (FY' 20) Break by Different Category



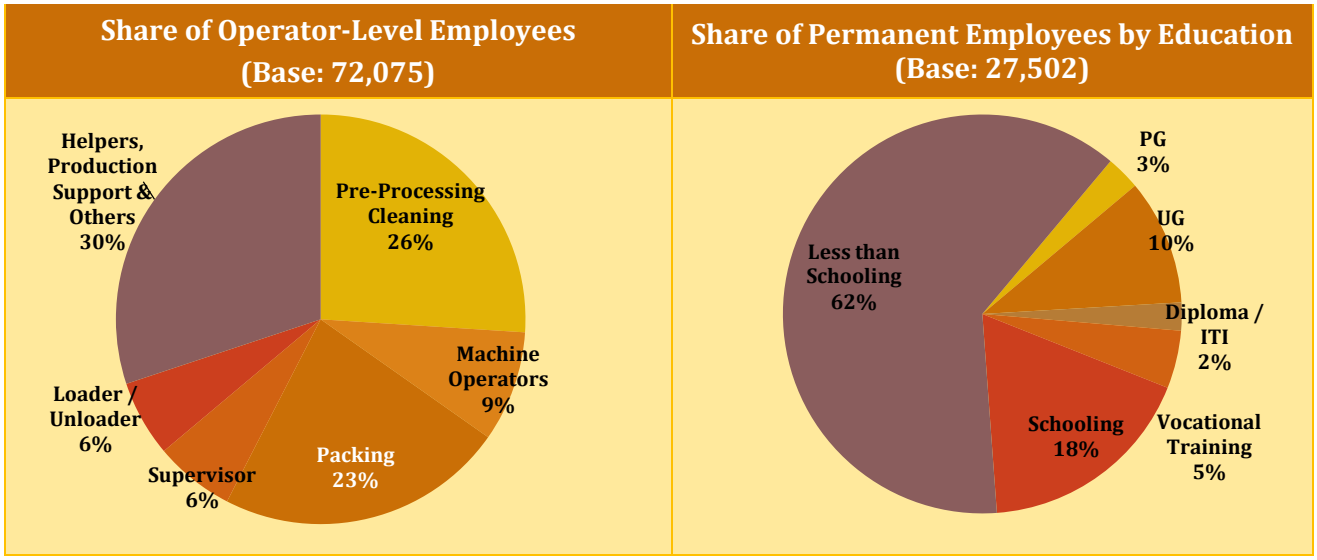


Figure 53: Share of Employees (FY' 20): By Different Category

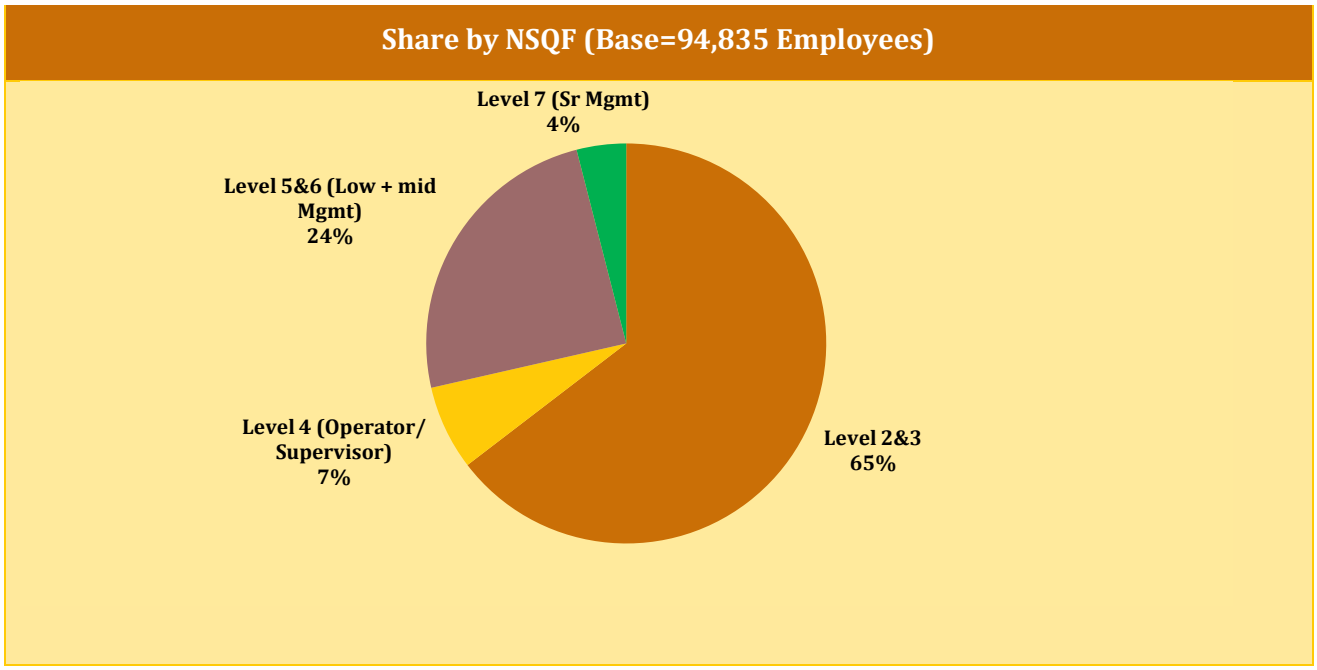


Figure 54: Share of Employees (FY'20): By NSQF levels

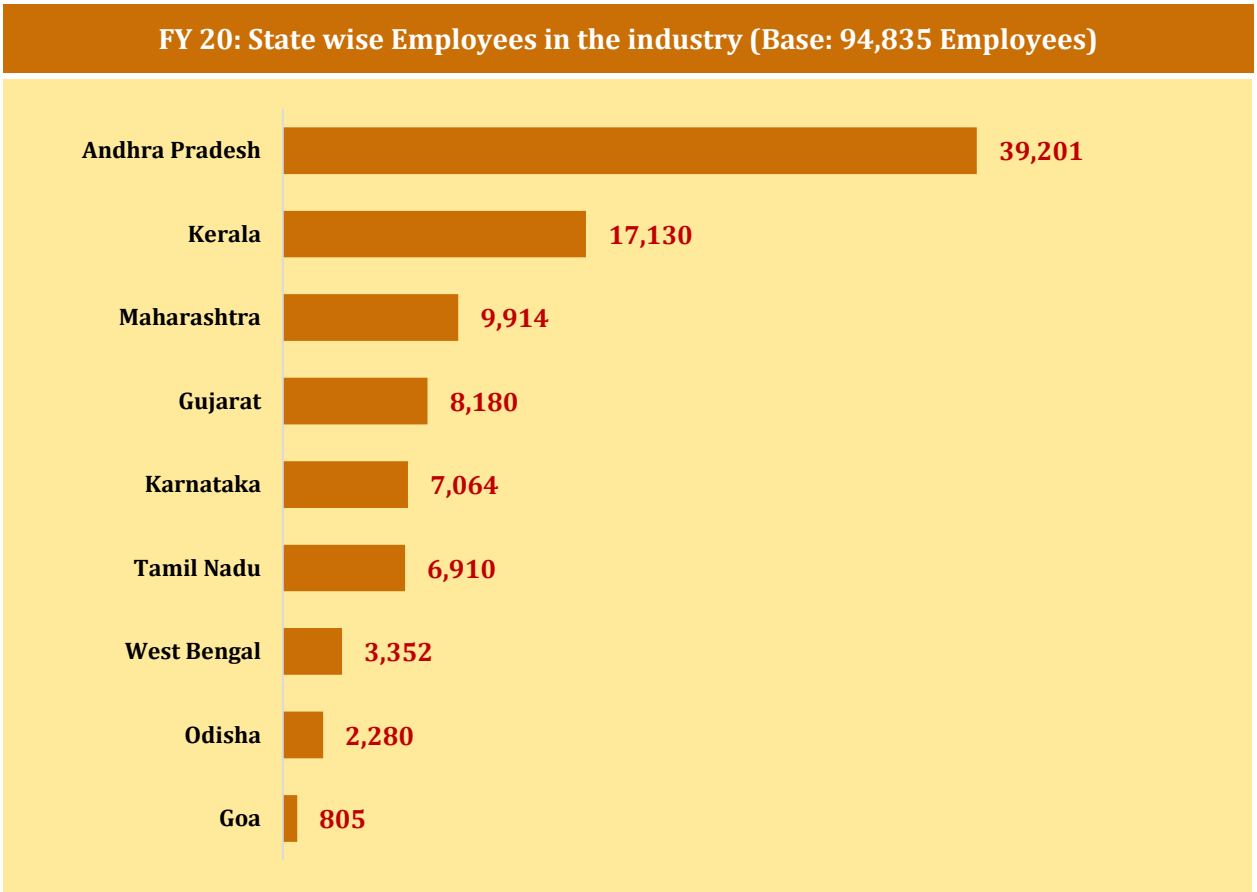


Figure 55: State wise Employees in the Industry (FY'20)

Source: Feedback Analysis

Top 9 states account to 100% of total employment in the industry

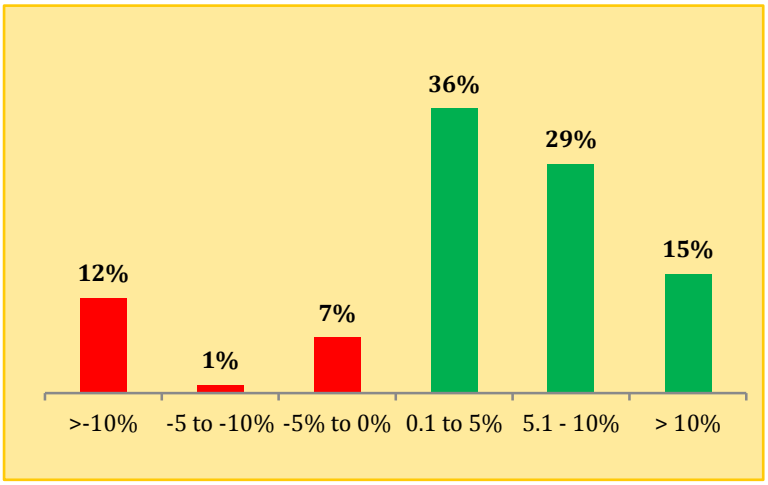
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Cleaning / Pre-Processing Labourers	The pre-processing work includes grading, sorting, distribution, evisceration, cutting, slicing, and cleaning in the case of fish, peeling, cleaning, and grading in the case of shrimp, evisceration, cleaning, and grading in the case of cephalopods. Women comprises of 80 – 90% of the cleaning / pre-processing labourers	3	✓	✓	✓	✓
2	Machine Operator (Processing Machinery	Operate machines to clean, cut, cook, smoke and brine, dehydrate or otherwise	4	✓	✓	✓	✓

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
	& Packaging Machinery)	process fish or seafood products. Also, operate machines to can, bag, box or otherwise package fish and seafood products. Operators of coolers / cold storage facility at the unit					
3	Supervisor	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
4	Packer	Canning and other forms of packaging	3		✓	✓	✓
5	Helpers	Misc. work including cleaning plants, Vehicles, Machinery, etc.	3	✓	✓	✓	✓
6	Loader / Unloader	Material handling, Loading & Unloading products.	3		✓	✓	✓
7	Technician	Machine maintenance	4		✓	✓	✓
8	Production Support	Weigh fish or shellfish, record weight and pack fish in ice. Sort fish and other products according to species, weight, and destination. Condition fish filets for wrapping or freezing.	3	✓	✓	✓	

Table 43: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

8.3.3 Past Growth of Employees (FY'17 – FY'20)



- 20% of the enterprises have experienced degrowth in their manpower in the past 3 years.
- 36% have indicated that their manpower has grown marginally (up to 5%).

Figure 56: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

8.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

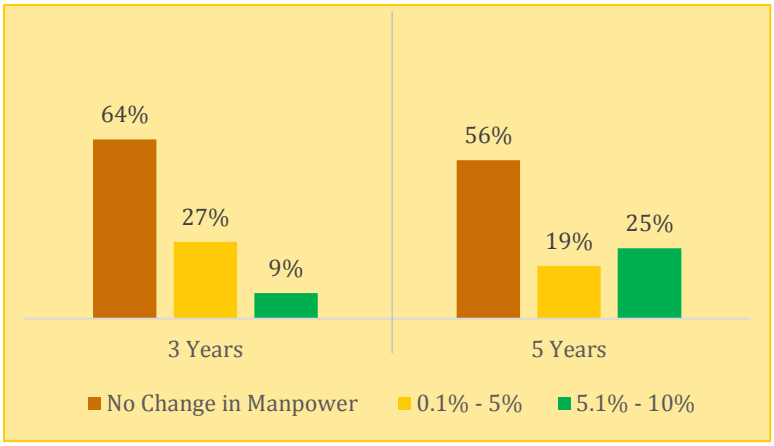
Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Plan to enhance the capacity	26%	12%	21%	80%
Plan to invest on technology	37%	9%	36%	80%
Plans to set up a new facility	0%		7%	20%
Increase / Introduce Exports		21%		
New Product Addition			14%	
Planning to invest in Internet of Things (IoT) or Automation			36%	

Table 44: Future Plans of the Companies covered

Automation or IoT; New Product Addition are predominantly the interest areas of large companies.

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- 1% - 1.5% in next 3 years (Average)
- 2% – 2.5% in next 5 years (Average)

Figure 57: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

Source: Feedback Analysis

8.4 Recruitment & Training Practice

Recruitment Practice

Walk-in is the key source of recruiting candidates across Operational level and Lower level employees. Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal training institutes offering food technology / food science programs

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Middle Management	• Formal training institutes offering food technology / food science programs
Lower Level Management	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 45: Recruitment Practice

Training Practice

Overall ~30% of the companies we have covered as part of the sample are providing training across levels when an employee joins the firm (On-the-Job training).

% of Companies offering training

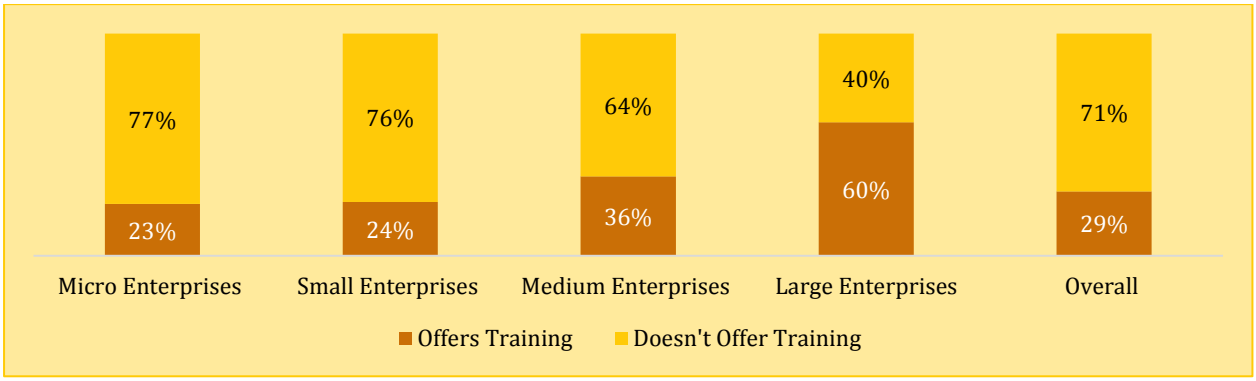


Figure 58: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered (Encountered in Primary Interviews)

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Processing Operations	Sort fish and seafood according to species and know-how the cleaning process for different type of products	Operator Level Employees & Lower-Level Employees	✓	✓	✓	✓
Product Handling	Detail the fish and seafood handling requirements. Hygienic handling of the products and the wastages	Operator Level Employees & Lower-Level Employees	✓	✓	✓	✓

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Storage	Storage temperature required at every stage of processing (Raw Material to Finished Products)	Operator Level Employees & Lower-Level Employees		✓	✓	✓
Operations Management	Training to detail the overall operations, manpower allocation, inspection, etc.	Supervisors / Managers			✓	✓
Supervision of product handling activities	Appropriate cooling methods, packing methods, latest technology, equipment operations, etc.	Supervisors / Managers				✓
Plant Maintenance	Maintenance checklist for equipment (processing and packing)	Operator Level Employees & Lower-Level Employees (Technicians / Machine Operators)				✓
Seafood Value Addition	Possible Value addition of the fish and seafood and the methodology of introducing value added products	Managers				✓

Table 46: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

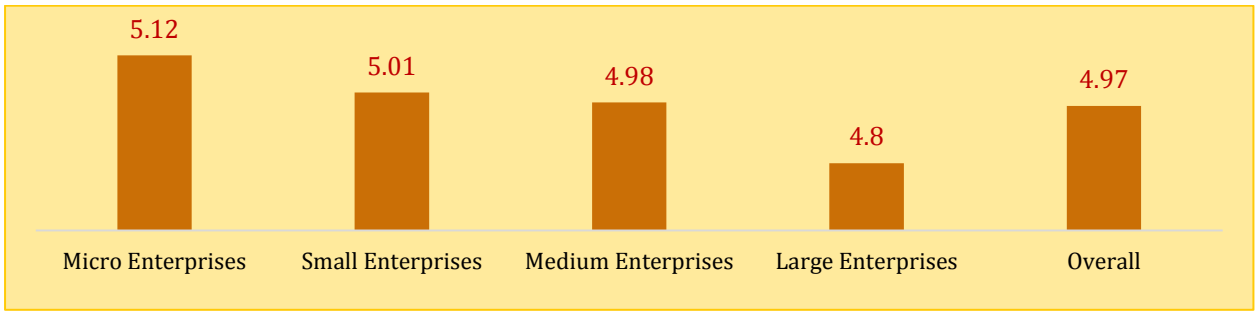


Figure 59: Effectiveness of Training

Source: Feedback Analysis

8.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

Key concerns raised by the fish and seafood service providers in terms of acquiring the skilled manpower are as follows

Only one training program designed for Fish & Seafood Processing under NSDC

- According to the processing companies, only one program has been designed by NSDC specific to Fish and Seafood Processing (Post Harvest) – "Fish and Seafood Processing Technician"
- The training offers employment restricted only to the Machine operators for the industry

Not Aware of Training Institutes Offering Relevant Programs

- Poor awareness of the training institutes focusing on fish and seafood processing
- Large and medium enterprises are aware of formal training institutes offering graduate programs on fish and seafood technology

Operator Level Employees are not formally trained

- Operator level employees are either secondary/Higher secondary schools and also the school dropouts. On-job training becomes mandatory.
- Higher employee attrition is another challenge where 64% of employees at the operator level and lower level are leaving the organizations within 3 years of their joining

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Processing Manager	Mid Management NSQF: 5	• Managerial Skills • Technical Know-how across functions • Interpersonal Skills • Leadership Skills • Domain Skills (Various Fish and Seafood Types, Value Added Products, etc.)) • Understanding the technology and adaptation to	• Ability to work with both the processing and packaging equipment • Training manpower at the lower level or operator level • Lack of leadership	✓	✓	✓	✓

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
		newer technologies					
Quality Control	Mid Management NSQF: 5	• Visual examination skills of the fresh fish and seafood • Assessing the quality for the finished products	• Lack of visual examination skills			✓	✓
Inventory Controller	Mid Management NSQF: 5	• To develop inventory management systems, maintain stock levels, and coordinate the logistics of orders and transfers.	• Knowledge of inventory management software • Analysis of demand and supply			✓	✓
Shift Supervisor / Supervisor	Lower-Level Management NSQF: 5	• Overseeing operations including Pre-processing, processing, packaging, and dispatch of the products • Technical and non-technical Know-how knowledge • Equipment operations and maintenance • Manpower planning • Manpower training	• Gaps in leadership/supervision skills leading to efficiency and monitoring issues • Lack of technical knowledge on multi-commodity storage practice • Best practices w.r.t material handling to reduce wastage during material handling	✓	✓	✓	✓
Maintenance Officer	Lower-Level Management NSQF: 4	• Knowledge on transformation from analogue to digital business model • Domain Skills	• Lack of update in technology	✓	✓	✓	✓
Clerks (Invoicing and other activities)	Operator Level Employees NSQF: 4	• Prepare invoice • Compile and maintain records of all billings	• Technical competencies / lack of operating knowledge on	✓	✓	✓	

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
		• Assist accounting team in preparing relevant documents	accounting software				
Loading / Unloading Labors	Operator Level Employees NSQF: 3	• Materials Handling	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygienic awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓	✓	✓

Table 47: Key job roles and their required skills and skill gaps

8.6 Future Projection – Sector & Employment

Projected growth of Processed Fish and Seafood market in India

Visionaries and Industry experts feel that there are certain inherent challenges within the industry due to Overfishing or damage to the ocean floor in the western region. This may result in limited growth in the overall Fish and Seafood production in the country. As a result, Frozen and Chilled Seafood market likely to grow at approx. 12% CAGR over next 10 years and the Shelf Stable Seafood market has the potential to grow at 25% CAGR.

	Value Market - Processed Fish & Seafood - Rs. Cr.				Volume Market
FY	Frozen Seafood	Chilled Seafood	Shelf Stable Seafood	Total	Production ('000 MT)
FY'20	752	221	133	1,106	26.1
CAGR	**12%**	**12%**	**25%**	14%	14%
FY'30	2,336	686	1,239	4,261	100.5
Share	**55%**	**16%**	**29%**		

Table 48: *Projected growth of Processed Fish and Seafood market in India*

Source: MPEDA, Seafood Exporters Association of India, Interactions with SMEs & Visionaries. Impact of COVID pandemic considered for the future estimates of both market & employment

Processing capacity and investment required to achieve the above processing levels

Parameter	Unit	Values
FY'20 Production	'000 MT	26.1
FY'30 Production (E)	'000 MT	100.5
Increase in production between FY'20 & FY'30	'000 MT	74.5
Considering 80% capacity utilization, additional processing capacity required	'000 MT	93.1
Investment norm	Rs. / MT	2,00,000
Total Investment required	**Rs. Cr.**	**1,861**

Table 49: Processing capacity and investment required to in the industry

Source: MPEDA

Note: Average investment towards setting up of 1 MT Fish and Seafood processing plant is Rs 150,000 on the higher side. The investment would vary by type of processing (Frozen, Shelf Stable, etc.) and product (Fish, Shrimp, etc.). More than Rs. 400 Cr. worth of projects are already in various stages of implementation. Government of India has recently allocated Rs. 3,737 Crore for the newly carved out Ministry of Fisheries, Animal Husbandry and Dairying.

Select ongoing and upcoming projects of Fish & Seafood Processing sector in India

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Odisha Industrial Infrastructure Devp. Corpn.	Deras Mega Seafood Park Project	Deras, Khordha, Odisha	New Unit	122
2	Falcon Marine Exports Ltd.	Deras Shrimp Processing & Freezing Unit Project	Deras, Khordha, Odisha	New Unit	86
3	Highland Agrotech L P	Gadabhanga Shrimp Processing and Cold Chain Unit Project	Gadabhanga, Baleshwar, Odisha	New Unit	53
4	Coastal Corporation Ltd.	Deras Shrimp Processing Unit Project	Deras, Khordha, Odisha	New Unit	51
5	Government Of Tamil Nadu, Department of Fisheries	Nagapattinam Fish Processing Park Project	Nagore village, Nagapattinam, Tamil Nadu	New Unit	23

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
6	Truism Resources L P	Deras Sea Food Processing Park Project	Deras, Khordha, Odisha	New Unit	23
7	B-one Business House Pvt. Ltd.	Deras Seafood Processing Unit 2 Project	Deras, Khordha, Odisha	New Unit	22
8	Amarsagar Seafoods Pvt. Ltd.	Deras Sea Food Processing Park Project	Deras, Khordha, Odisha	New Unit	11
9	Kerala Industrial Infrastructure Devp. Corpn. Ltd.	Beypore Marine Park Project	Beypore, Kozhikode, Kerala	New Unit	10
10	Sabri Food Products Pvt. Ltd.	Deras Prawn Processing Plant Project	Deras, Khordha, Odisha	New Unit	2

Table 50: Select ongoing and upcoming projects of Fish & Seafood Processing sector in India

Source: CMIE & Projects Today

FY'20 employment estimation in Processed Fish & Seafood sector in India

Company Category	Average no. of Employees	FY'20 Total No. of Employees in Processed Fish & Seafood Industry	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	500	5,000	15%	3.9	0.78
Medium Enterprises	300	21,000	35%	9.1	0.44
Small Enterprises	210	47,460	40%	10.4	0.22
Micro Enterprises	75	21,375	10%	2.6	0.12
Total		**94,835**		**26.1**	**0.28**

Table 51: FY'20 employment estimation in Processed Fish & Seafood sector in India

**Discussion with few Processing Plants and SMEs*

Note: The above employment estimation considers only the processing activity and excludes the Ice Plant, Pre-processing storage, etc. Generally, the industry is classified based on capacity. However, for uniformity, the industry has been classified based on the revenue guidelines of RBI. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection in Processed Fish & Seafood sector in India

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large	15%	15.1	0.78	19,262	14,262
Medium	40%	40.2	0.44	92,455	71,455
Small	35%	35.2	0.22	159,977	112,517
Micro	10%	10.1	0.12	82,343	60,968
Total		**100.5**	**0.28**	**354,036**	**259,201**

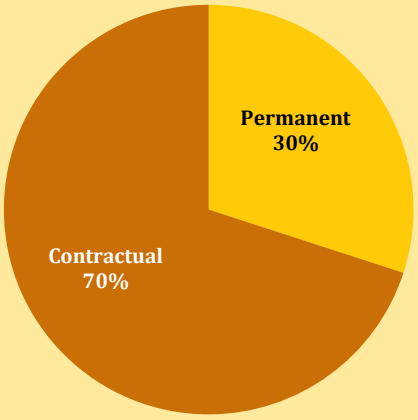
Table 52: Future employment projection in Processed Fish & Seafood sector in India

**as per discussion with the processing plants and SMEs, contribution of various types of companies in the Fish & Seafood industry will remain same over next 10 years*

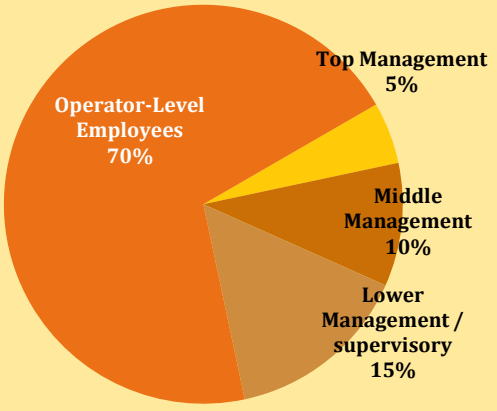
 # Based on discussions with equipment manufacturers and SMEs, there could be marginal adoption of automation / industry 4.0 in the coming years. However, that will have negligible impact on the productivity of the employees. Hence, the same productivity values have been considered for future employment generation potential.

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category

Permanent Vs Contractual Employees (Base: 2,59,201)



Share by Managerial Level (Base: 2,59,201)



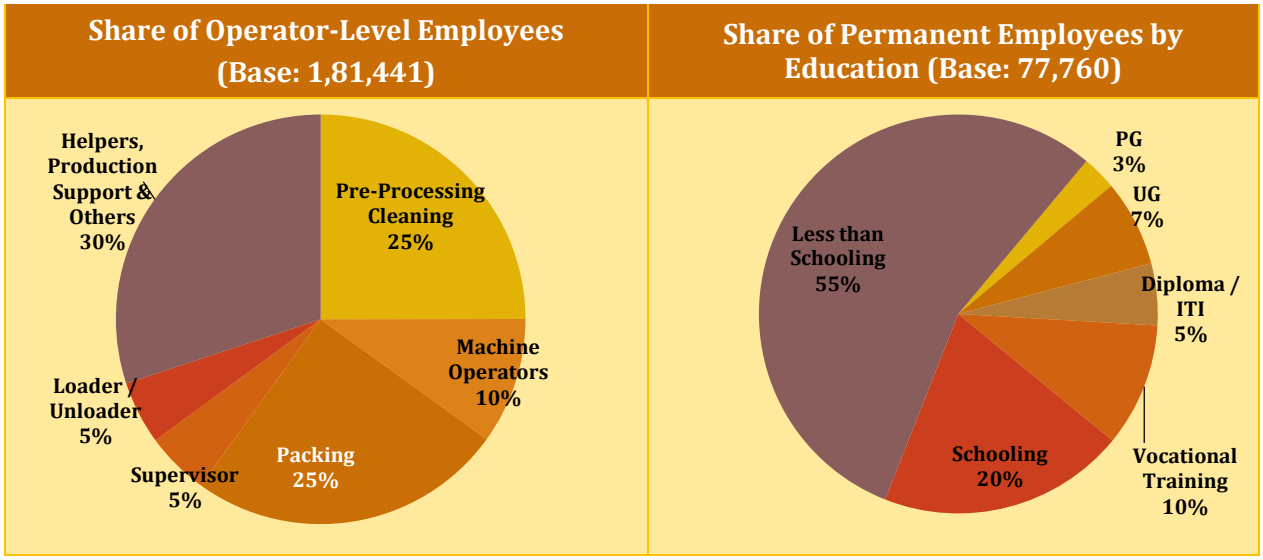


Figure 60: *Share of FY'20 - FY'30 Employment Generation potential: By Different Category*

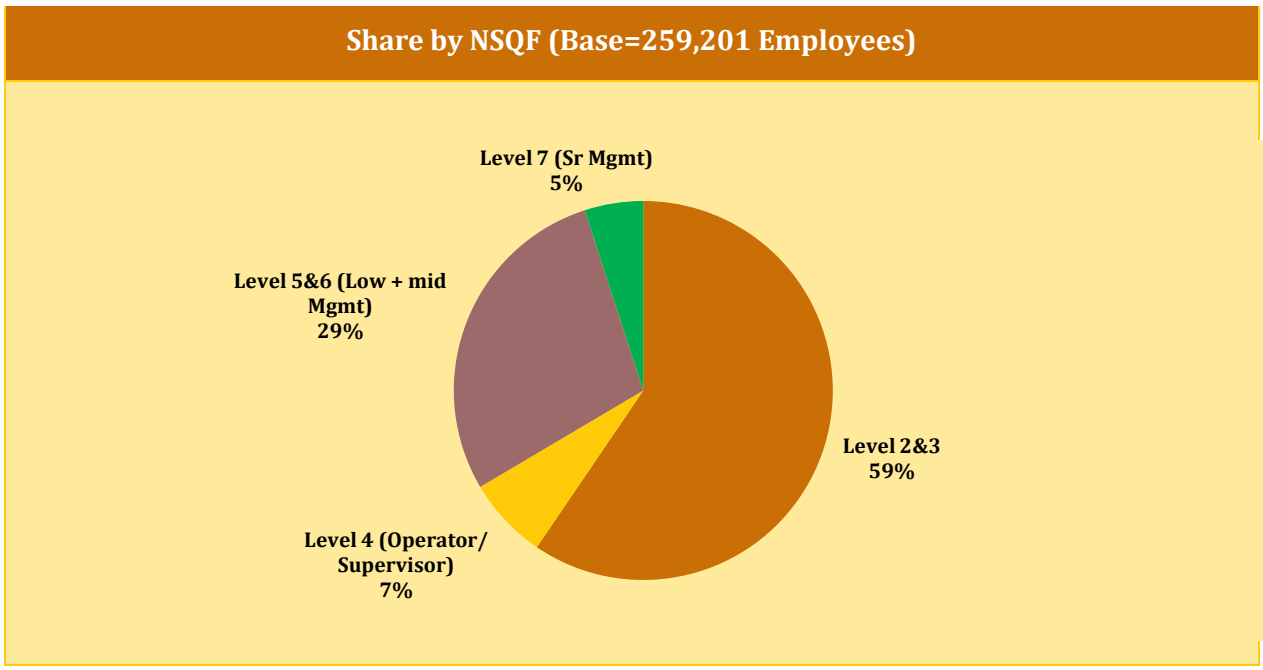


Figure 61: *Share of FY'20 - FY'30 Employment Generation potential: By NSQF levels*

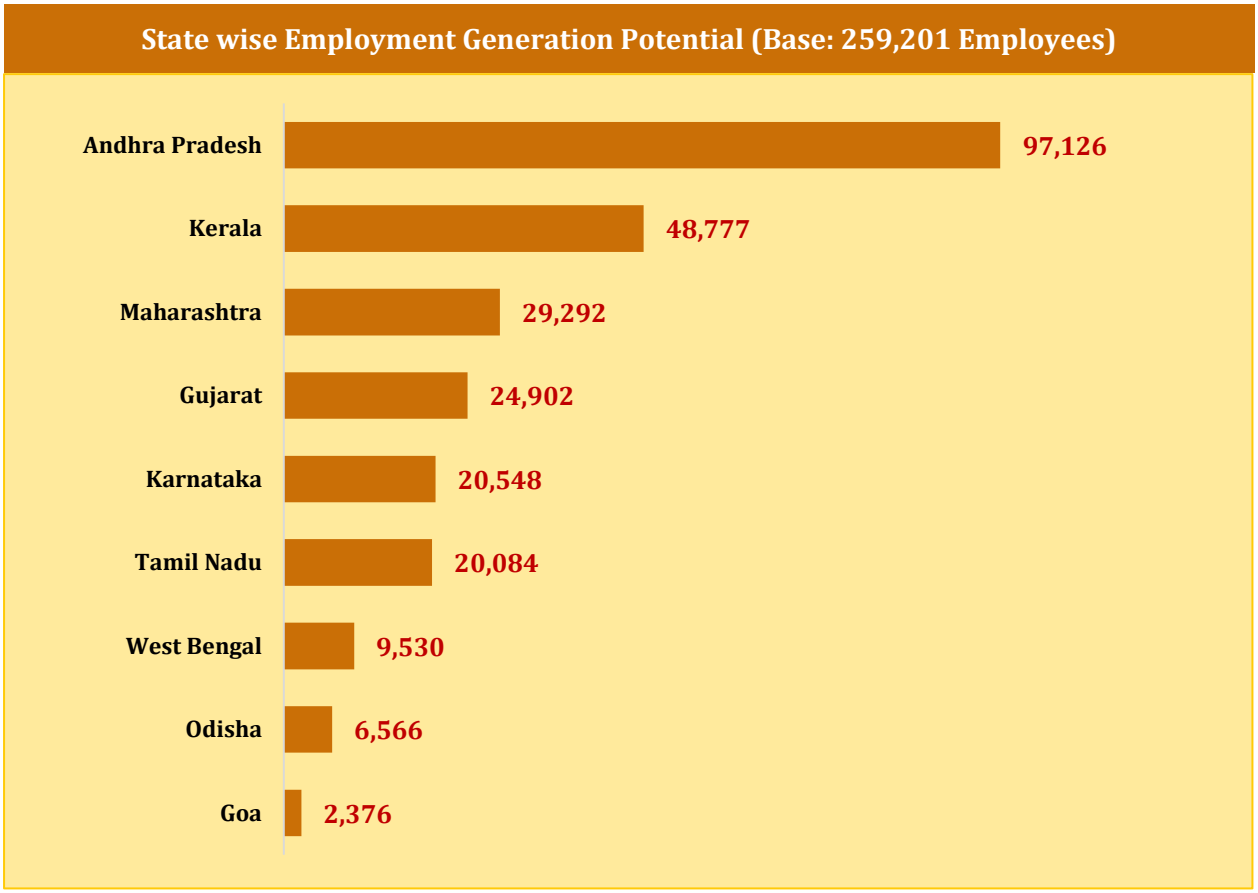


Figure 62: *State wise Employment Generation Potential*

Source: Feedback Analysis

Top 9 states account to 100% of total employment in the industry

8.7 Existing & Emerging Prominent Job Roles Which Requires Skilling

Following are the specific existing and emerging prominent job roles that will create employment opportunities in Fish and Seafood Processing Sub-sector in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area.	✓	✓	✓	

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
		supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	• Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.				
Shell remover and Cleaner	3	A Shell remover and Cleaner is responsible carrying out various pre-processing activities under supervision such as cleaning and gutting fish; cutting fish into fillets or steaks; etc.	**A Shell remover and Cleaner must be able to:** • Clean, gut and cut fish into fillets or steaks. • Remove shells from select seafoods. • Carry and sorting and grading of fish and seafood. • Store fish and seafood at the recommended temperature. • Follow the applicable food safety and hygiene standards. **A Shell remover and Cleaner must know and understand:** • Relevant parameters for sorting and grading fish and seafood. • Applicable food and personal safety standards.	✓	✓	✓	✓
Defrosting & Washing Machine Operators	4	A Defrosting & Washing Machine Operators is responsible for setting up and operating machinery defrost	**A Defrosting & Washing Machine Operators must be able to:** • Set up and operate defrosting and washing machinery to defrost the frozen fish and wash the	✓	✓	✓	

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		and wash the fish and seafood.	same for further processing. • Ensure compliance with the applicable quality standards by carrying out corrective machine adjustments as required. • Follow the applicable food hygiene and safety standards. **A Defrosting & Washing Machine Operators must know and understand:** • Applicable food and personal safety standards.				
Filleting & Cutting Machine Operator	4	A Filleting & Cutting Machine Operator is responsible for setting up and operate the processing machinery for filleting and cutting the fish and seafood to make a required end product.	**A Filleting and Cutting Machine Operators must be able to:** • Set up and operate filleting and cutting machinery to processing fish and seafood to make a required end product or to prepare for further processing. • Ensure compliance with the applicable quality standards by carrying out corrective machine adjustments as required. • Follow the applicable food hygiene and safety standards. **A Filleting and Cutting Machine Operators must know and understand:** • Applicable food and personal safety standards.	✓	✓	✓	✓
Squid Pressing Machine Operator	4	A Squid Pressing Machine Operator is responsible for setting up and operate the processing machinery for squid	**A Squid Pressing Machine Operator must be able to:** • Set up and operate squid pressing machinery to processing squid to make a required end product or to		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
		pressing and processing to make relevant product for further process.	prepare for further processing. • Ensure compliance with the applicable quality standards by carrying out corrective machine adjustments as required. • Follow the applicable food hygiene and safety standards. • Recycle and dispose the waste generated appropriately. **A Squid Pressing Machine Operator must know and understand:** • Applicable food and personal safety standards.				
Fish & Seafood Processing Plant Supervisor	5	A Fish & Seafood Processing Plant Supervisor or responsible for supervising a team of fish and seafood processing workers at processing plants. The individual is also responsible for conducting regular inspections and ensuring smooth functioning of various equipment at the plant.	**A Fish & Seafood Processing Plant Supervisor must be able to:** • Train and supervise a team of processing plant workers, including work allocation and scheduling of task • Ensure the applicable and health and safety standards are followed • Inspect the processing plant working conditions and equipment to ensure compliance with the applicable standards • Coordinate with the relevant service providers or vendors for repair and maintenance of the processing plant equipment **A Fish & Seafood Processing Plant Supervisor must know and understand:**	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Applicable food and personal safety standards • Various activities carried out during pre-processing and processing of fish and seafood • Use of various equipment used at a fish processing plant and the best practices to be followed to achieve machine-efficiency • Team handling practices				
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.	✓	✓	✓	✓

Table 53: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

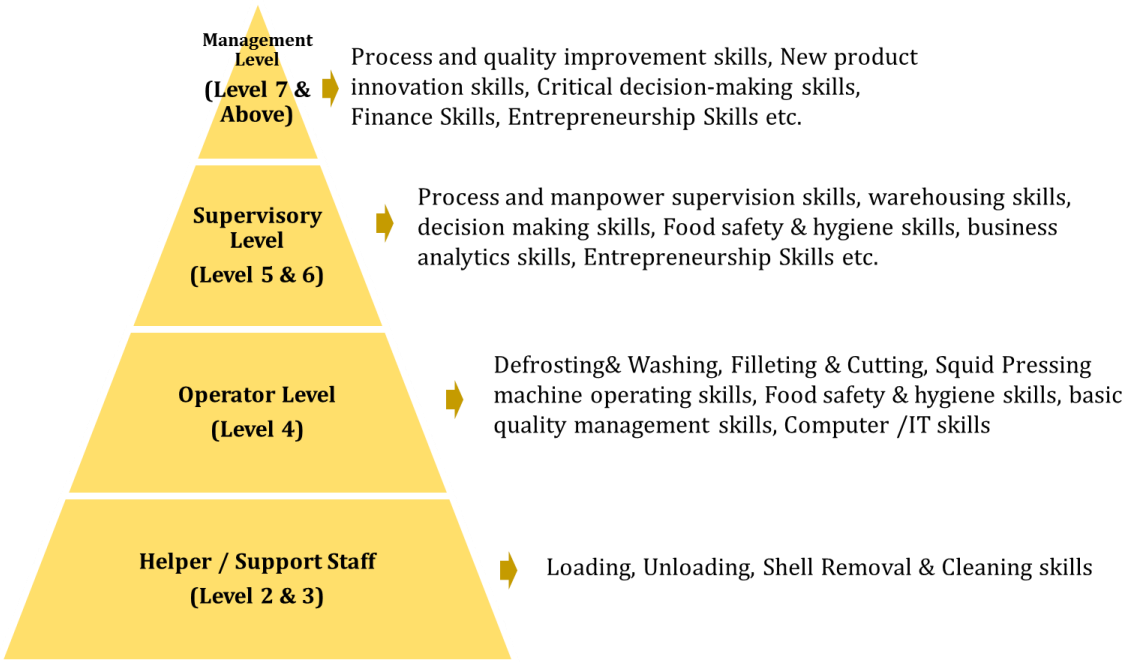


Figure 63: *Skill Sets required across multiple levels in the sector*

8.8 Expectations from the Industry Stakeholders

There are lot of training institutes on fisheries and aqua culture. But, the institutes offering training programs for the fish and seafood processing is very limited in India.

Following are the key expectations from the industry.

Need for Specialized Training Institutes in Key Clusters

- Specialized training institutes that cater to the needs of the fish and seafood processing industry should be developed and focused on skilling of manpower in the key clusters like Veraval, Kochi, Chennai, Ratnagiri, Kolkata, etc.
- As on now, the fish and seafood processing companies have limited awareness about the current training infrastructure in the country.
- There are various companies in the coastal areas like Kochi, Veraval, Ratnagiri, etc. are ready to offer internship programs to train the manpower.

Training Programs Focusing Operator Level Functions & Women Employment

- Around 80% of the total manpower categorized under operator level functions. And 80-90% of the operator level employees are women employees
- Almost 100% of these employees are unskilled employees and on-the job training are provided to the employees

- Training programs designed to these stakeholders (Women employees at operator level), primarily focusing cleaning, sorting, grading, cutting, conditioning, wrapping, etc. would benefit the industry

Continuous Training

- Higher attrition among women employment drive for the continuous training support for the industry.
- There will be less productivity in the industry for the specific months every year when the fisheries are not allowed. Processing companies are expecting to utilize those timelines for the training support for their existing employees.

Offering Practical Training Courses

- Offering certification at the lower level where the course involving practical work experience in addition to academic study
- There are various companies in the coastal areas like Kochi, Veraval, Ratnagiri, etc. are ready to offer internship programs to train the manpower

Chapter 9: Sub-Sectoral Analysis – Fruits & Vegetable Processing

9.1 Market summary

The fruit and vegetable processing industry holds significant growth potential owing to the low levels of processing currently being done in the country. The withdrawal of excise duty on fruit and vegetable products in the country has led to the growth of this industry. India is the world's second-largest producer of fruits and vegetables. To reduce wastage of fresh fruits and vegetables, and to add value to them, processes like canning, dehydration, pickling, provisional preservation and bottling have been introduced. However, percentage of processing of fruits and vegetables is currently less than 3% as compared to countries like China (23%), the United States (65%) and Philippines (78%).The Indian fruit and vegetable processing industry is also experiencing conducive growth environment, owing to the abundant supply of raw materials and favourable government policies like Pradhan Mantri Kisan Sampada Yojana (PMKSY), rapid urbanization and increasing consumer affordability resulting in lifestyle changes and preference towards various processed foods such as frozen peas, chopped vegetables, sauces and jams, canned fruits and vegetables etc. India also has a geographical advantage as it is centrally located to key export destinations such as Africa, the Middle East, Oceania and the Southeast Asia. Growth in exports of processed fruits and vegetables has been aided by significant improvements in processing technology, packaging quality and greater private sector participation and the trend is likely to continue in the coming years.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	8,542
No. of registered units	1,426
Past Growth rate (CAGR) (FY' 15 – FY' 20)	7.6%
Total Number of Employees (FY' 20)	88,258 nos.
Overall Exports (FY'20)	INR 3,173 crs.
Expected Market ('000 MT) FY' 2030	17,500
Future growth rate (FY' 20 – FY' 30)	7.4%
Total Employee Estimation (FY' 30)	1,80,821 nos.
Overall Employment Additions (FY' 20 – FY' 30)	92,563 nos.

Table 54: Fruits & Vegetable Processing: Key Industry Indicators

9.2 Present State of the Industry & Future Outlook

The fruit and vegetable processing industry holds significant growth potential owing to the low levels of processing currently being done in the country. In 2017, there were 1,100+ factories that

were related to processing and preserving of fruit and vegetables[25]. The numbers have increased to around 1,426 processing units at present.

The withdrawal of excise duty on fruit and vegetable products in the country has led to the growth of this industry. India processed about 8542 MMT of Fruits and vegetables in FY 20.

Andhra Pradesh, Gujarat, Uttar Pradesh, Maharashtra and Karnataka are the five major fruit producing states in India and account for ~51% of the total fruit production. West Bengal, Bihar, Uttar Pradesh, Madhya Pradesh and Gujarat are five major states that accounts for ~55% of the national vegetables production.

Increasing export opportunities are helping the market flourish, and are expected to drive future growth in the industry. Top importers from India include the U.S., the Netherlands, Saudi Arabia, the U.K., Iran, and France

On course with the 'Digital India' mission, the Maharashtra government has planned to digitize the functioning of private wholesale vegetable markets to prevent farmers from being cheated and to increase transparency. The government's focus to launch various schemes to provide the required infrastructure to the industry is also helping in the development of the industry.

These include schemes to provide capital, subsidies, duty free export of products, tax incentives to investors, along with the Mega Food Parks Scheme and Scheme for Integrated Cold Chain

Capricorn Food Products India Limited and Shimla Hills Offerings Private Limited are among the top players in the fruit and vegetable processing industry in India

Manufacturing Clusters

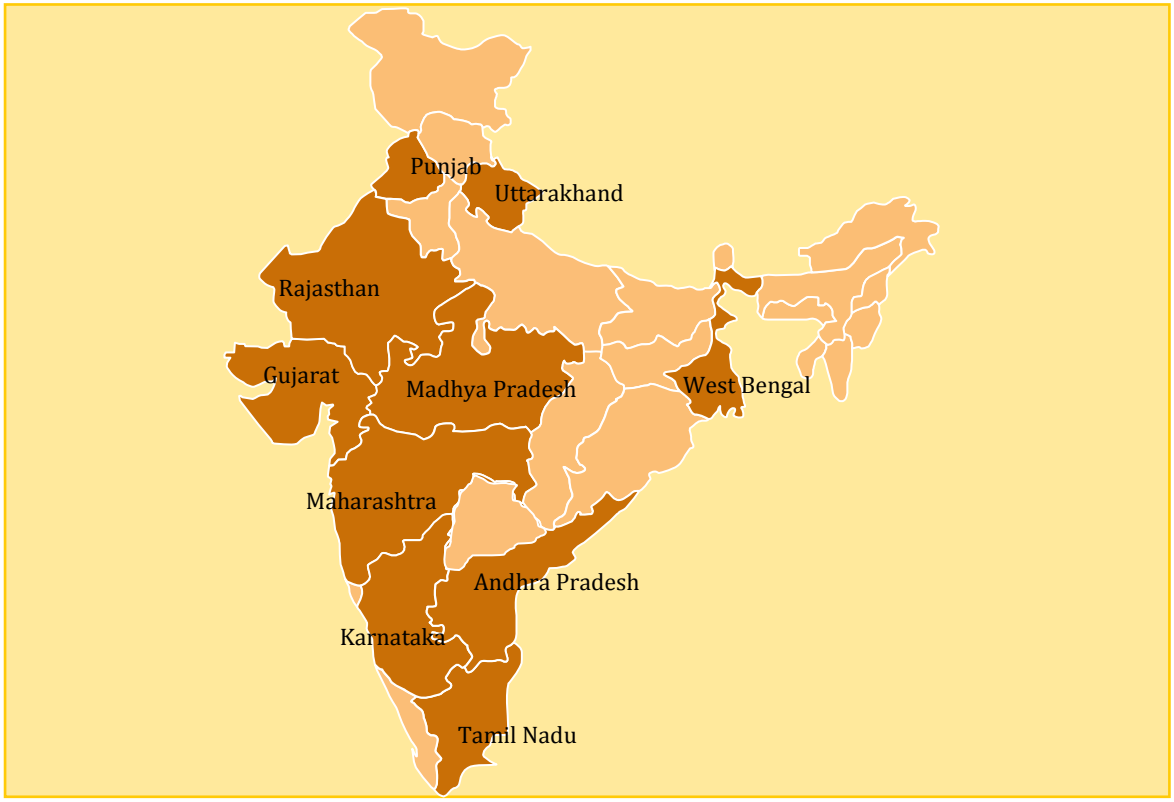


Figure 64: *Manufacturing Clusters*

[25] Annual Survey of Industries (2016-17)

Top 10 states account to 89% of total employment in the F&V Processing industry

Market Overview

India is the second-largest producer of fruits and vegetables, thereby ensuring easy availability of the main raw materials for the fruit and vegetable processing industry.

There are around 15 agro-climatic zones in India that can support the production of most fruits. However, the country's level of fruit processing is very low (~2.2%), compared to countries like Philippines (78%), China (23%) and the United States (65%). Processing in this segment is expected to grow to 25% by 2025[26].

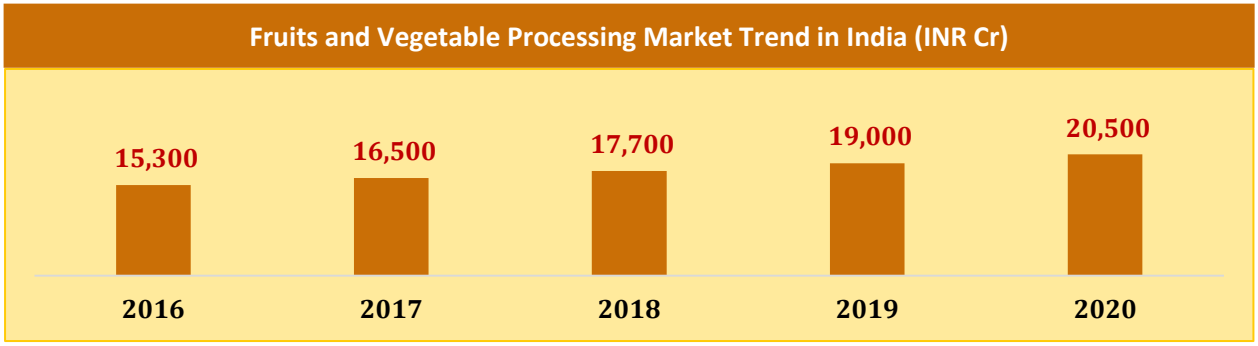


Figure 65: *Fruits and Vegetable Processing Market Trend in India (INR Cr)*

Source: Foodprocessingindia.gov.in, Subject Matter Expert

The market is highly fragmented with a more significant presence of the unorganized sector, mainly in the pickle producing segment. The organized industry comprises large and established players with a diverse product portfolio.

A few of the significant players include Dabur India Limited, ITC Limited, Hindustan Unilever Limited and Mother Dairy Fruit Vegetable Private Limited.

The industry is witnessing a rise in the number of foreign players as well, owing to significant growth opportunities. Some of the tech start-ups in the Indian fruit and vegetable industry include Ecozen Solutions Private Limited, Rakyan Beverages, Raav Techlabs Private Limited and Nutricane Beverages Private Limited.[27]

Increasing export opportunities

- India is the second-largest producer of fruits and vegetables globally, and its vast production base offers tremendous opportunities for exports
    - With productions of 94.883 Mn metric Tonnes of fruits and 180.68 Mn metric Tonnes of vegetables in FY 2018[28] (according to the first advance estimates), it contributes a significant portion to the export portfolio of the country

[26] https://www.researchgate.net/publication/309177866_Post-harvest_Situation_and_Losses_in_India
[27] Source: https://foodprocessingindia.gov.in/sectors/Fruits-Vegetables
[28] https://pib.gov.in/PressReleseDetailm.aspx?PRID=1703196

- The country has exported 306,990.47 MT of Processed Fruits, Juices & Nuts to the world for the worth of INR 3173.42[29] Crores during the year 2020-21.

- Growth in exports of processed fruits and vegetables has been aided by significant improvements in processing technology, packaging quality and greater private sector participation
    - India has an edge in cost of production compared to its competitors in Asia and other developed countries
    - India is one of the largest exporters of mango pulp in the world
    - It is also a prominent exporter of dried and preserved vegetables
- Favorable climate, a large agriculture sector and livestock base, a long coastline, and inland water resources have given India a comparative advantage over other processed food exporting economies
- Moreover, India also has a geographical advantage as it is close to key export destinations such as Africa, the Middle East, Oceania, and Southeast Asia

9.3 Present Employment Scenario & Analysis

Category of the Companies by Revenue

Category of the Company	Definition (Revenue Range)	Remarks
Micro Enterprises	< Rs 5 Cr	Micro enterprises are primarily small-scale manufacturer focuses only on specific products of F&V
Small Enterprises	RS 5.1 – 50 Cr	Small enterprises would typically focus few products like canning or dehydrated F&V, etc where the minimal process that are required and for the export purpose
Medium Enterprises	Rs 50.1 – 250 Cr	Medium-Sized Enterprises predominantly have multiple product range caters to domestic and exports market
Large Enterprises	> Rs 250 Cr	Large Sized Enterprises are organized players focusing multiple products for domestic and exports market

Table 55: Category of the Companies by Revenue

9.3.1 Sample Coverage by Categories of Companies & Region

Category of the Company	Sample Coverage (N)	East	North	West	South
Micro Enterprises	**250**	**22%**	**18%**	**36%**	**24%**

[29] http://apeda.gov.in/apedawebsite/SubHead_Products/Other_Processed_Fruits_Vegetables.htm

Category of the Company	Sample Coverage (N)	East	North	West	South
Small Enterprises	185	12%	19%	30%	39%
Medium Enterprises	46	9%	27%	22%	42%
Large Enterprises	7	40%	20%	20%	20%
Total	488	20%	17%	32%	31%

Table 56: Sample Coverage by Categories of Companies & Region

9.3.2 Total No. of Employees.

Past Trend of employment in the Fruit & Vegetable Processing Industry

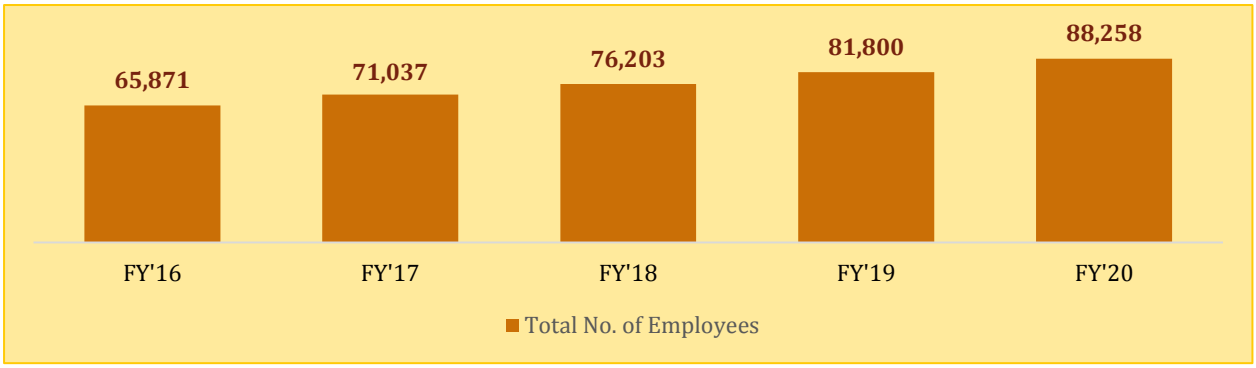
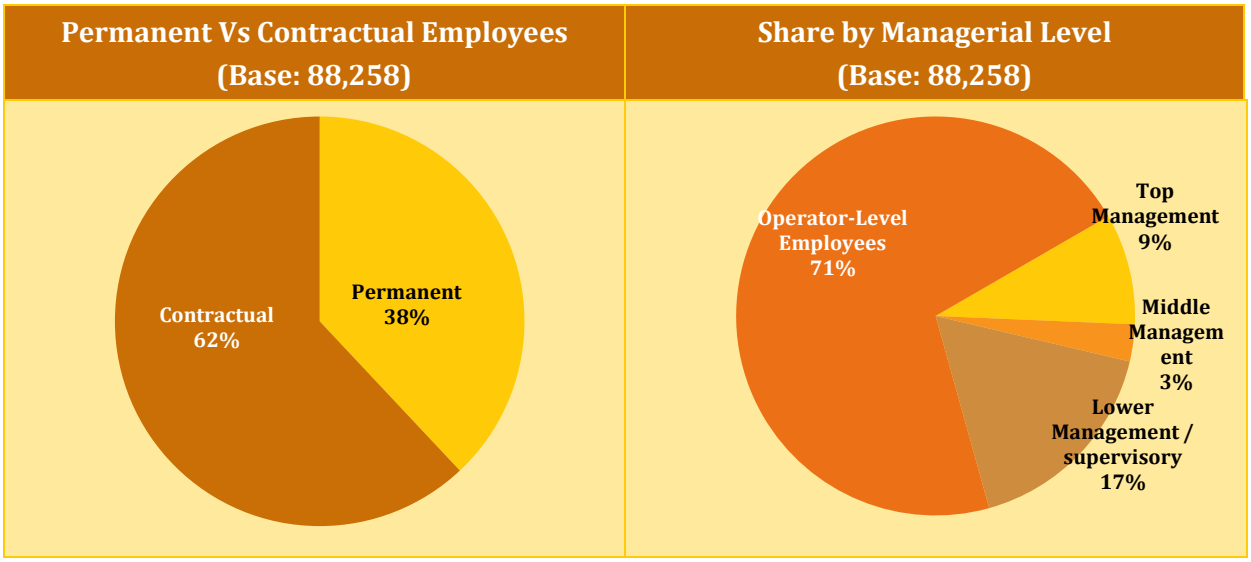


Figure 66: Past Trend of employment in the Fruit & Vegetable Processing Industry

Source: Feedback Analysis

Share of Employees (FY' 20) Break by Different Category



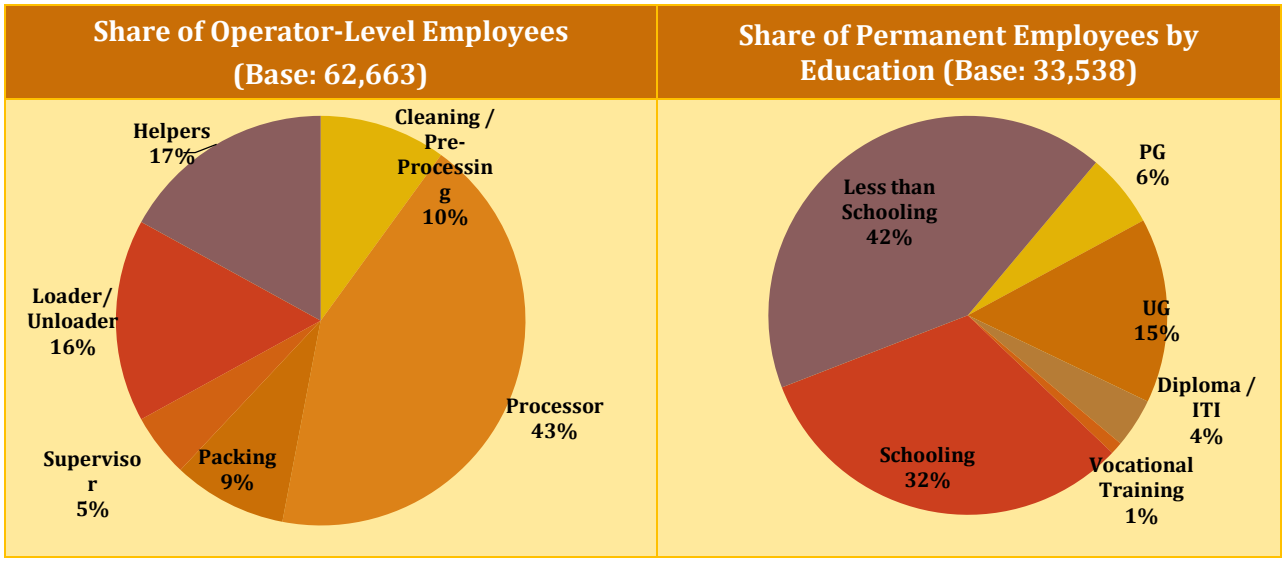


Figure 67: *Share of Employees (FY' 20): By Different Category*

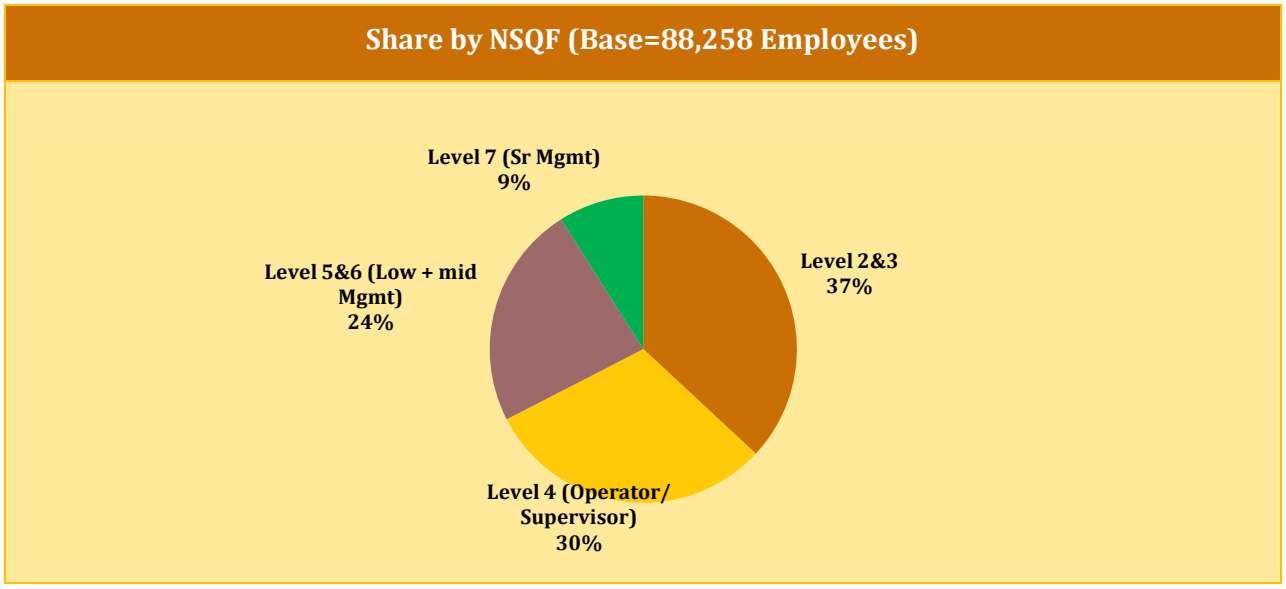


Figure 68: *Share of Employees (FY'20) : By NSQF levels*

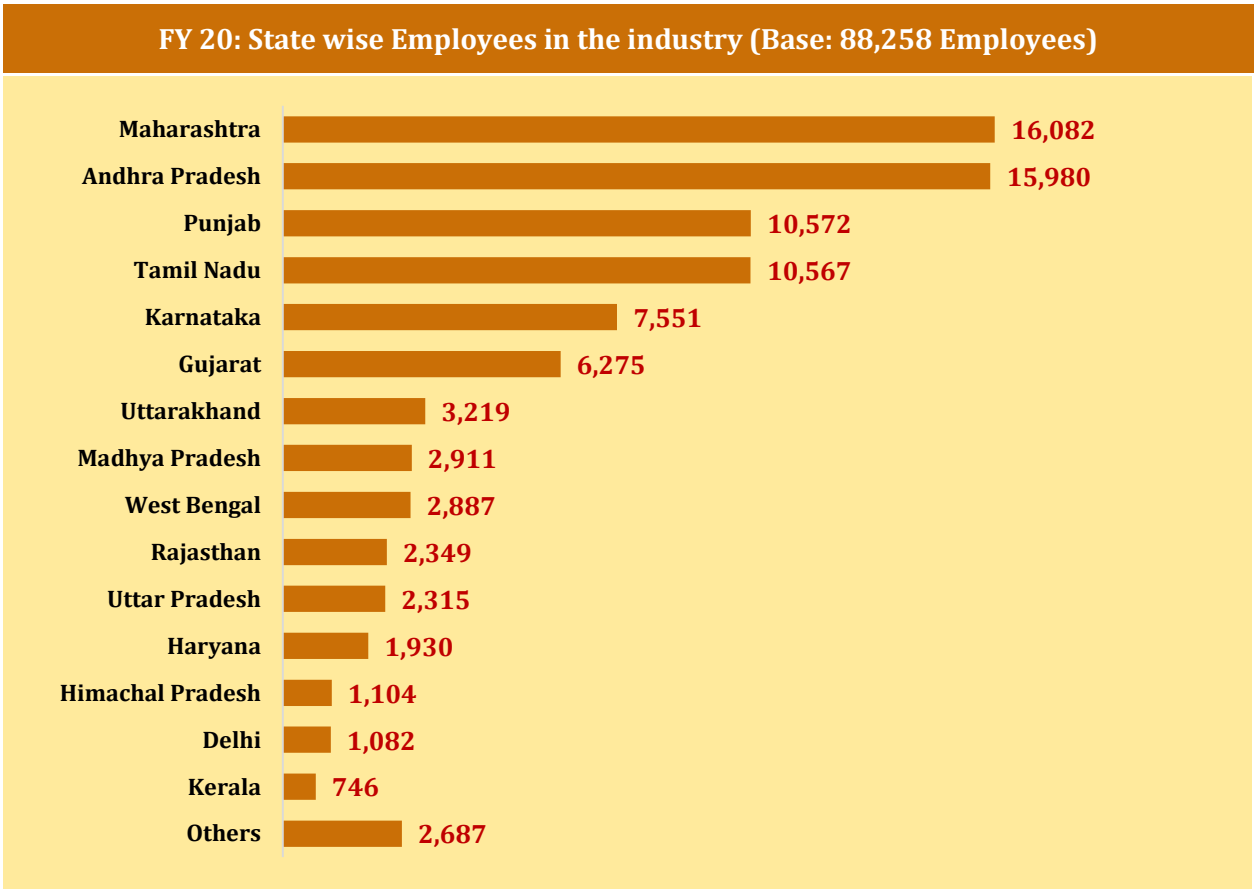


Figure 69: State wise Employees in the Industry (FY'20)

Source: Feedback Analysis

Top 15 states account to 97% of total employment in the industry

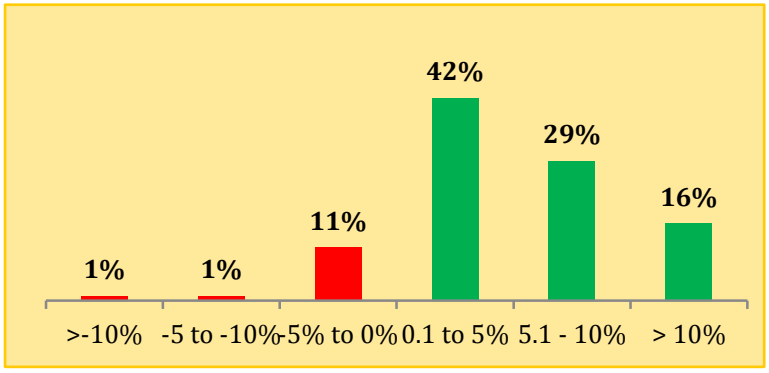
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Pre-Processing Labourers	The pre-processing work includes primarily cleaning, grading, and sorting, cutting, etc.	3	✓	✓	✓	✓
2	Processing Labourers	Operating IQF; Mixing/Grindings/Cutting Machines, Other processing machinery based on the type of F&V processed and the required outputs	4	✓	✓	✓	✓
3	Machine Operator	Operating machine and also for maintenance of machines	4	✓	✓	✓	✓

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
	(Packing Machinery)						
4	Shift Supervisor	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
5	Helpers	Misc. work including cleaning plants, Machinery after every batch, etc.	3	✓	✓	✓	✓
6	Loader / Unloader	Material handling, Loading & Unloading products.	3	✓	✓	✓	✓
7	Accountant / Invoicing Clerk	Managing accounting and day to day transaction entry in the ledger	4	✓	✓		
8	Sales and Distribution Support	Sales Executives / Distribution to the Channel Partners	4	✓	✓	✓	

Table 57: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

9.3.3 Past Growth of Employees (FY'17 – FY'20)



- 15% of the enterprises surveyed have experienced degrowth in the manpower
- ~45% of the medium enterprises have seen **growth of >5%** in the last 3 years (FY 17 – FY 20)

Figure 70: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

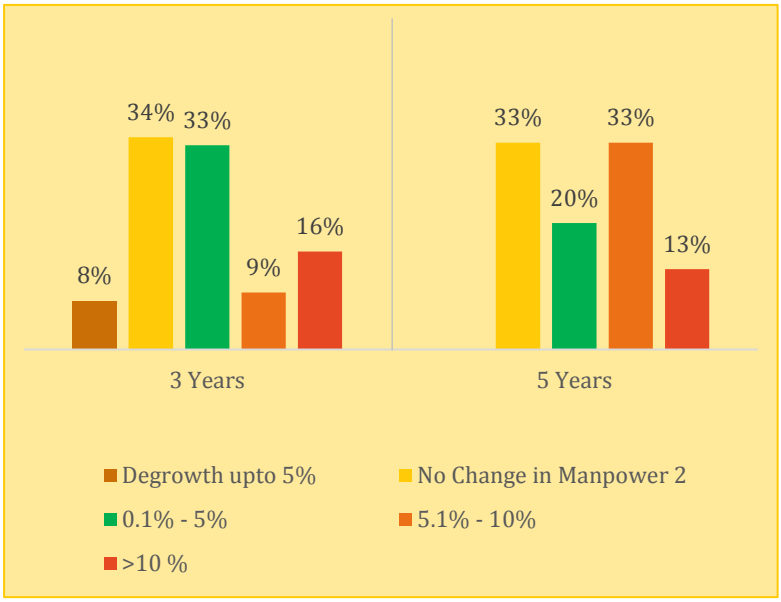
9.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Planning to invest in Internet of Things (IoT) or Automation	46%	50%	30%	100%
Plan to invest on new equipment	40%	38%	35%	100%
Plan to enhance the production capacity	58%	48%	33%	100%
Plans to launch new products	41%	29%	37%	100%
Plans to increase exports	3%	2%	26%	100%
Plans to invest on R&D	0%	6%	11%	100%

Table 58: Future Plans of the Companies covered

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- >5% of the manpower growth in next 3 – 5 years

Figure 71: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

Source: Feedback Analysis

9.4 Recruitment & Training Practice

Recruitment Practice

Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	Formal training institutes offering Food Tech / Food Science programs
Middle Management	Formal training institutes offering Food Tech / Food Science programs
Lower-Level Management	No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 59: Recruitment Practice

Training Practice

Overall, 15 – 16% of the companies we have covered as part of the sample are providing training across levels when an employee joins the firm (On-the-Job training).

% of Companies offering training

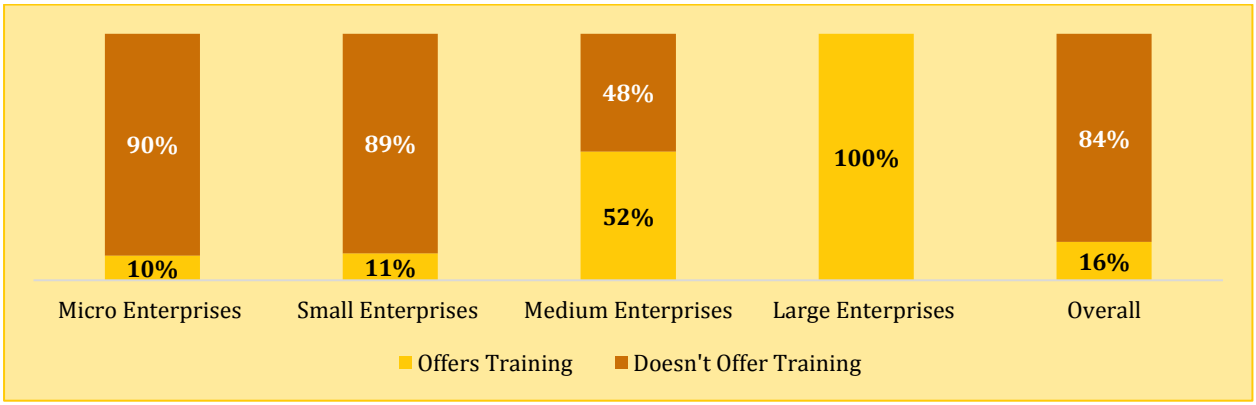


Figure 72: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered (Encountered in Primary Interviews)

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Processing Operations	Proper cleaning of F&V, grading, sorting, and preparation for processing line chopping, etc.	Operator Level Employees	✓	✓	✓	✓
Processing Operations	Operating machines for further processing of F&V to get required output (Pulp, Dehydrated, juices, jams, sauces, etc.)	Operator Level Employees; Lower-Level Employees; Supervisors / Managers	✓	✓	✓	✓
Supervision of product handling activities	Appropriate packing methods, latest technology, equipment operations, etc.	Supervisors / Managers			✓	✓
Plant Maintenance	Maintenance checklist for equipment (processing and packing)	Operator Level Employees & Lower-Level Employees (Technicians / Machine Operators)				✓
Packing	Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio					✓

Table 60: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

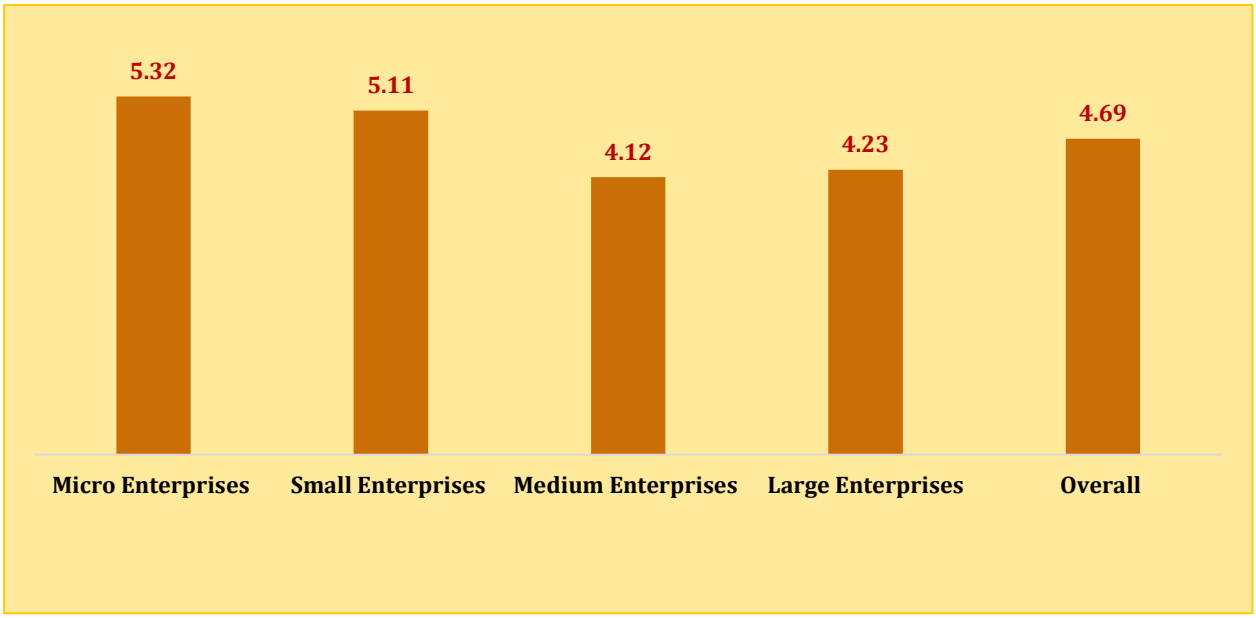


Figure 73: *Effectiveness of Training*

Source: Feedback Analysis

9.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

- With increasing technology, the existing employees would require continuous learning in this industry.
- Most of the training are in-house training with the purchase of new equipment or adopting new technology.
- The freshers joining the industry are having the basic knowledge on the processing but have limited knowledge on the plant operations or technology already in practice.
- Small and Micro units depend on walk-ins or known contacts for unskilled or semi-skilled labours. The primary reason for the same is limited awareness of the training institutes in the vicinity that offers programs on F&V processing

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
Quality Control	Mid Management NSQF: 5	• Monitoring the Raw Materials quality • Ingredient's quality check • Assessing the quality for the finished products	• Unable to maintain the similar quality across batches	✓	✓	✓	
Maintenance Officer	Lower-Level Management NSQF: 4	• Knowledge on latest equipment and the old equipment (primarily for maintenance) • Domain Skills	• Lack of update in technology	✓	✓	✓	
Processors	Lower-Level Management NSQF: 4	• Technical know-how on operating processing machines • Limited wastage during process • Packaging techniques (canning, etc.)	• Lack of update in technology	✓	✓	✓	✓
Loading / Unloading Laborers	Operator Level Employees NSQF: 3	• Materials Handling • Storage process	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygienic awareness and knowledge/ practice • Inability to learn and operate across functions	✓	✓	✓	

Table 61: Key job roles and their required skills and skill gaps

9.6 Future Projection – Sector & Employment

Based on discussions conducted with the Visionaries and Industry experts, Indian processed F&V industry likely to reach approx. Rs. 42,000 Cr. or 17.5 Mn MT by FY'30. This translates into CAGR of approx. 7% - 8% over next 10 years.

Reasons for such growth are the followings:

- India is the world's second-largest producer of fruits and vegetables. To reduce wastage of fresh fruits and vegetables, and to add value to them, processes like canning, dehydration, pickling, provisional preservation and bottling have been introduced. However, percentage of processing of fruits and vegetables is currently less than 3% as compared to countries like China (23%), the United States (65%) and Philippines (78%). Experts believe that the processing level could reach to 5-5.5% over next 10 years' period. This translates to 7% - 8% growth of Indian F&V processing industry.
- The Indian fruit and vegetable processing industry is also experiencing conducive growth environment, owing to the abundant supply of raw materials and favourable government policies like Pradhan Mantri Kisan Sampada Yojana (PMKSY)
- Rapid urbanization and increasing consumer affordability resulting in lifestyle changes and preference towards various processed foods such as frozen peas, chopped vegetables, sauces and jams, canned fruits and vegetables etc.
- India also has a geographical advantage as it is centrally located to key export destinations such as Africa, the Middle East, Oceania and the Southeast Asia.
    - Growth in exports of processed fruits and vegetables has been aided by significant improvements in processing technology, packaging quality and greater private sector participation and the trend likely to continue in the coming years.
    - India has an edge in cost of production compared to its competitors in Asia and other developed countries. India is one of the largest exporters of mango pulp in the world. It is also a prominent exporter of dried and preserved vegetables

Year	Market Size (Rs. Cr.)	Market Size ('000 MT)	Y-o-Y Growth
FY'20	20,500	8,542	7.9%
FY'21 (E)	22,000	9,167	7.3%
FY'22 (E)	23,600	9,833	7.3%
FY'23 (E)	25,400	10,583	7.6%
FY'24 (E)	27,300	11,375	7.5%
FY'25 (E)	29,400	12,250	7.7%
FY'26 (E)	31,600	13,167	7.5%
FY'27 (E)	34,000	14,167	7.6%
FY'28 (E)	36,500	15,208	7.4%

Year	Market Size (Rs. Cr.)	Market Size ('000 MT)	Y-o-Y Growth
FY'29 (E)	39,200	16,333	7.4%
FY'30 (E)	42,000	17,500	7.1%

Table 62: Future Market & Growth Rate of Processed Fruit & Vegetable market in India

Source: Interaction with SMEs & Visionaries

Export Opportunity

Current export share is around 5% of the total production of processed Fruits & Vegetables. It is likely to reach around 7% over next 10 years' period. This translates to around 11% CAGR between FY'20 & FY'30.

Future Trend of Exports of Processed Fruits & Vegetables from India ('000 MT)

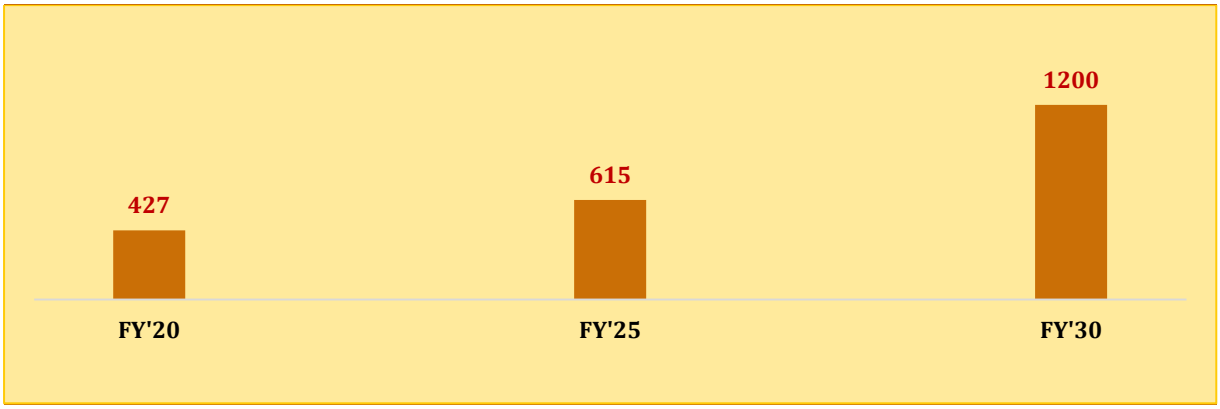


Figure 74: Future Trend of Exports of Processed Fruits & Vegetables from India ('000 MT)

Source: Feedback Analysis

Processing Capacity Requirement and investment required in the F&V Processing Sector

Parameter	Unit	Values
FY'20 Production	'000 MT	8,542
FY'30 Production	'000 MT	17,500
Increase in production between FY'20 & FY'30	'000 MT	8,958
Considering 80% capacity utilization, additional processing capacity required	'000 MT	11,198
Investment norm	Rs. / MT	18,750
Investment required	**Rs. Cr.**	**20,996**

Table 63: Processing Capacity Requirement and investment required in the sector

Source: Plant / Equipment Manufacturers & SMEs

Select ongoing and upcoming projects in Indian F&V Processing sector

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Manpasand Beverages Ltd.	Sri City New Beverages Manufacturing Plant Project	Chittoor, Andhra Pradesh	New Unit	150
2	B L Agro Inds. Ltd.	Bareilly Juice Plant Project	Bareilly, Uttar Pradesh	New Unit	121
3	Patanjali Food & Herbal Park Pvt. Ltd.	Vizianagaram Anchor Unit (Juice Extraction) Project	Vizianagaram, Andhra Pradesh	New Unit	45
4	Avantnature Foods Pvt. Ltd.	Mastenahalli Dehydrated Fruit & Vegetables Herbs Project	Chikkaballapura, Karnataka	New Unit	17
5	Riviana Foods Pvt. Ltd.	Pannasandra Pickled Vegetables and Other Agro Processing Manufacturing Unit Project	Tumkur, Karnataka	New Unit	17
6	Himachal Pradesh Horticultural Produce Mktg. & Processing Corpn. Ltd.	Parwanoo Juice Processing Plant Modernisation Project	Solan, Himachal Pradesh	Ren. /Mod.	12
7	Gujarat State Co-op. Mktg. Fedn. Ltd.	Amreli Peanut Butter Manufacturing Plant Project	Amreli, Gujarat	New Unit	6
8	Cremica Food Park Pvt. Ltd.	Singha Apple Juice Concentrate Manufacturing Plant Project	Una, Himachal Pradesh	New Unit	NA
9	Himachal Pradesh Horticultural Produce Mktg. & Processing Corpn. Ltd.	Chamba Fruit Processing Plant Project	Chamba, Himachal Pradesh	New Unit	NA
10	Himachal Pradesh Horticultural Produce Mktg. & Processing Corpn. Ltd.	Parala Fruit Processing Plant Project	Shimla, Himachal Pradesh	New Unit	NA
11	Manpasand Beverages Ltd.	Khurda (Eastern India) New Beverages Manufacturing Plant Project	Khordha, Odisha	New Unit	NA

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
12	Myshimla Fruit Players Pvt. Ltd.	Baghari Jam & Chutney Manufacturing Plant Project	Shimla, Himachal Pradesh	New Unit	NA
13	ETG Agro Pvt. Ltd.	Almond Processing Plant (Kheda)	Kheda, Gujarat	New Unit	NA

Table 64: Select ongoing and upcoming projects in F&V Processing sector

Source: CMIE & Projects Today

FY'20 employment estimation in F&V Processing Sector in India

Company Category	Average no. of Employees	FY'20 Total No. of Employees in F&V Processing industry	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	950	15,200	25%	2,135	140
Medium Enterprises	230	23,920	30%	2,563	107
Small Enterprises	55	31,570	33%	2,819	89
Micro Enterprises	24	17,568	12%	1,025	58
Total		**88,258**		**8,542**	**97**

Table 65: FY'20 employment estimation in F&V Processing Sector in India

**Discussion with the F&V processing units & SMEs*

Note: LMS classification has been made based on overall revenue of the companies. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection in F&V processing industry in India

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	25%	4,375	140	31,141	15,941
Medium Enterprises	30%	5,250	107	49,007	25,087
Small Enterprises	33%	5,775	89	64,680	33,110
Micro Enterprises	12%	2,100	58	35,993	18,425
Total		**17,500**	**97**	**180,821**	**92,563**

Table 66: Future employment projection in F&V processing industry in India

** As per discussion with the F&V processing units and SMEs, contribution of various types of companies in the F&V processing industry will remain same over next 10 years*

 # Based on discussions with equipment manufacturers and SMEs, there could be marginal adoption of automation / industry 4.0 in the coming years. However, that will have negligible impact on the productivity of the employees. Hence, the same productivity values have been considered for future employment generation potential.

Share of Employees (FY'20 – FY'30) Break by Different Category

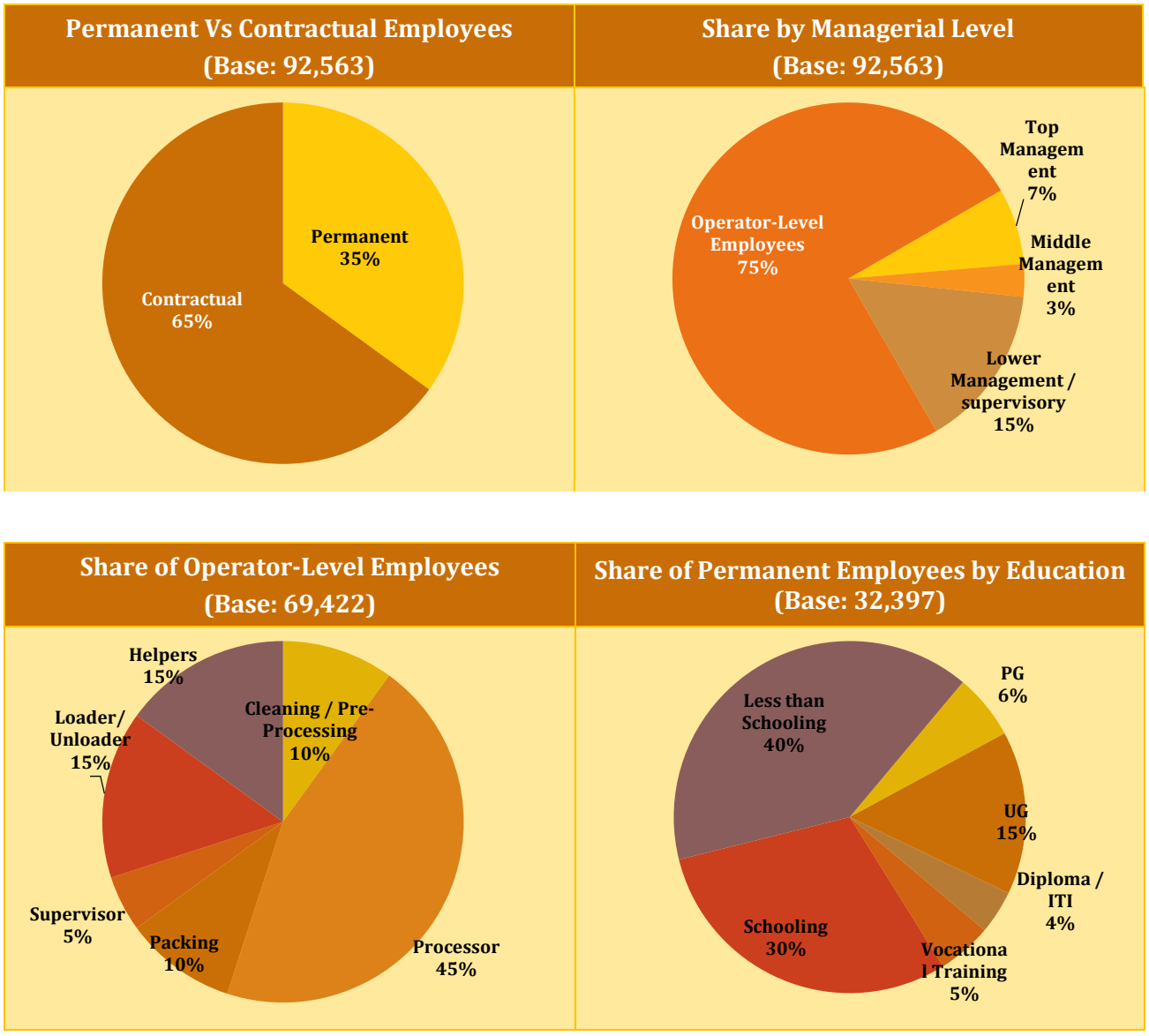


Figure 75: Share of FY'20 - FY'30 Employment Generation potential: By Different Category

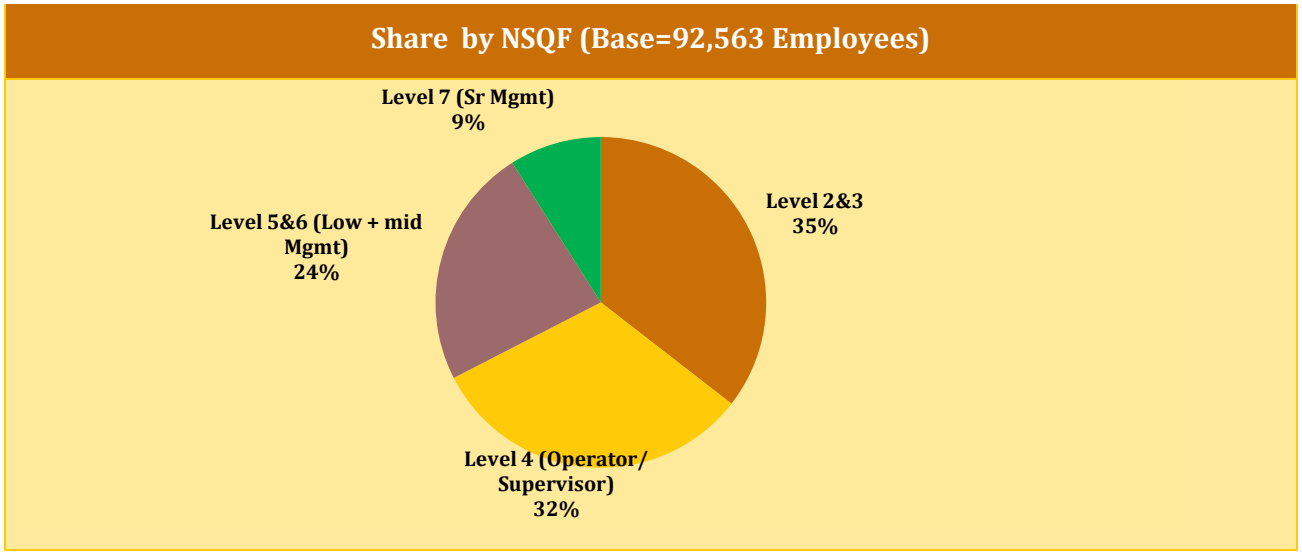


Figure 76: *Share of FY'20 - FY'30 Employment Generation potential: By NSQF levels*

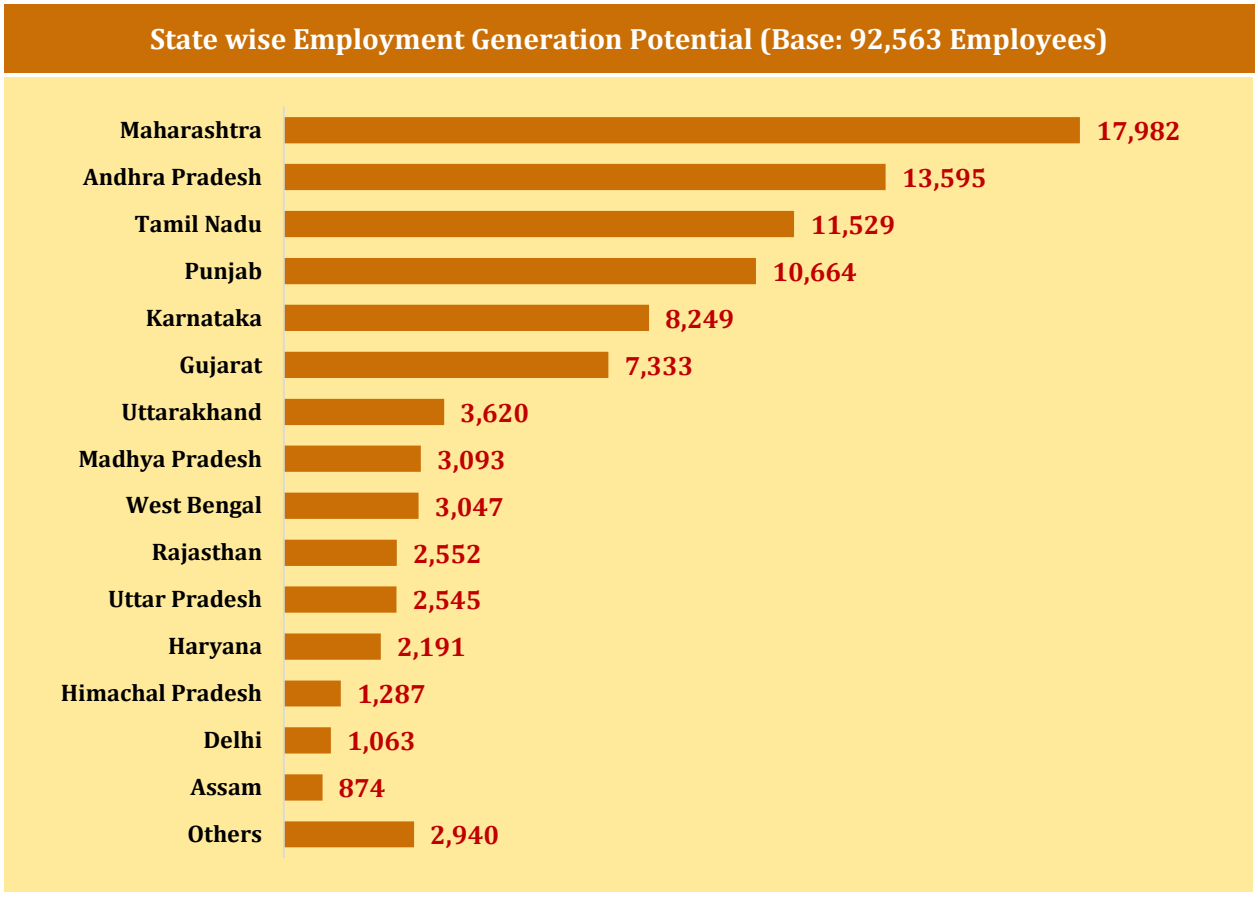


Figure 77: *State wise Employment Generation Potential*

Source: Feedback Analysis

Top 15 states account to 97% of total employment in the industry.

9.7 Existing & Emerging Prominent Job Roles Which Requires Skilling

Following are the specific existing and emerging prominent job roles that will create employment opportunities in F&V processing Sub-sector in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.	✓	✓	✓	
Grader, Sorter & Cleaner	3	A Grader, Sorter & Cleaner is a Pre-Processing Operator perform various activities such as blanching, pre-treatment and applicable of chemical preservatives as part of the pre-processing process to prepare the	**A Grader, Sorter & Cleaner operator must be able to:** • Clean fruits and vegetables. • Carry out blanching to inactivate enzymes and microorganisms. • Cure root and tubers following the appropriate practices. • Carry out pre-treatment of produce at cold or high temperature.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		F&V for further processing.	• Apply chemical preservatives to control pests. • Store pre-processed fruits and vegetables appropriately. **A Grader, Sorter & Cleaner must know and understand:** • Various methods of pre-processing fruits and vegetables and relevant requirements. • Applicable food hygiene and safety standards. • Use of the relevant tools and equipment. • Use of a ripening chamber.				
Freeze Drying & Dehydrating Equipment Operator	4	A Freeze Drying & Dehydrating Equipment Operator processes fruits and vegetables using a freeze drying or lyophilization method. The individual is also responsible for maintaining the relevant processing equipment.	**A Freeze Drying & Dehydrating Equipment Operator must be able to:** • Carry out fruits and vegetable processing activities using freeze drying methods or dehydrating the required products using lyophilization methods. • Maintain various F&V processing equipment. • Follow the applicable food hygiene and safety practices. **A Freeze Drying & Dehydrating Equipment Operator must know and understand:** • Various methods of F&V processing.		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Applicable food and personal safety standards. • How to carry out repair and maintenance of relevant F&V processing equipment.				
Bottling / Pouch Plant Operator	4	A Bottling / Pouch Plant Operator is responsible for packing fruits and vegetables using the appropriate packaging equipment.	**A Bottling / Pouch Plant Operator must be able to:** • Select and use the appropriate packaging material according to the type of processed fruits and vegetables. • Prepare and operate the appropriate packaging equipment to pack a variety of fruits and vegetables. • Follow the applicable food hygiene and safety standards. • Carry out standard repair and maintenance of the packaging equipment. **A Bottling / Pouch Plant Operator must know and understand:** • Appropriate packing material to be used to pack. • How to prepare and use the relevant packaging equipment. • Applicable food and personal safety standards. • How to maintain the packaging equipment.		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
F&V Processing Plant Supervisor	5	A F&V Processing Plant Supervisor is responsible for overseeing a team of workers and ensuring smooth functioning of the processing unit along with adherence to applicable standards on food hygiene and personal safety.	**A F&V Processing Plant Supervisor must be able to:** • Train and supervise a team of F&V processing unit workers including work allocation and scheduling of tasks. • Ensure the F&V processing is carried out as per the defined quality and safety standards. • Carry out regular inspections to ensure smooth functioning of various equipment and arrange for their repair and maintenance when required. **A F&V Processing Plant Supervisor must know and understand:** • Applicable F&V processing methods. • Effective team handling practices. • Correct use of various F&V processing equipment and their repair and maintenance needs.	✓	✓	✓	✓
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture,	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy.			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		or nutrients. Test quality of materials or finished products.	• Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data				
Fruit Technologist	6	A Fruit technologist, also called scientists, study the physical, chemical, and biological composition of fruits and other relevant products which are further processed into various forms.	**A Fruit Technologist must be able to:** • Modify existing products and processes and develop new ones. • Select raw materials and other ingredients from suppliers. • Prepare product costings based on raw materials and manufacturing costs to ensure profitable products. • Audit suppliers or manage internal audits • Run trials of new products - either alongside or together			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			with product development **A Fruit Technologist must know and understand:** • Global product innovations. • Applicable health and safety standards				
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.	✓	✓	✓	✓
Jam and Jelly Producer	4	A Jam and Jelly Producer is responsible for organising the ingredients required for the production of jam and jelly;	**A Jam and Jelly Producer must be able to:** • Organise the ingredients required for producing jam and jelly Prepare fruits and fruit juice for the production		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		preparing fruit and fruit juice for jam and jelly production; operating the relevant machineries, tools, equipment to produce jam and jelly; packing jam and jelly and in appropriate containers. The individual is also responsible for carrying out regular repair and maintenance of the relevant machineries, tools, and equipment.	of jam and jelly Produce jam and jelly using the relevant machineries, tools, and equipment • Pack jam and jelly in appropriate containers Maintain the relevant machineries, tools, and equipment • Follow the applicable health and safety standards **A Processing Plant Operator must know and understand:** • Applicable food safety and hygiene standards The process of producing jam and jelly and the ingredients required for the purpose • Appropriate temperature required for preparing jam and jelly • How to operate and maintain the relevant machineries, tools, and equipment				

Table 67: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

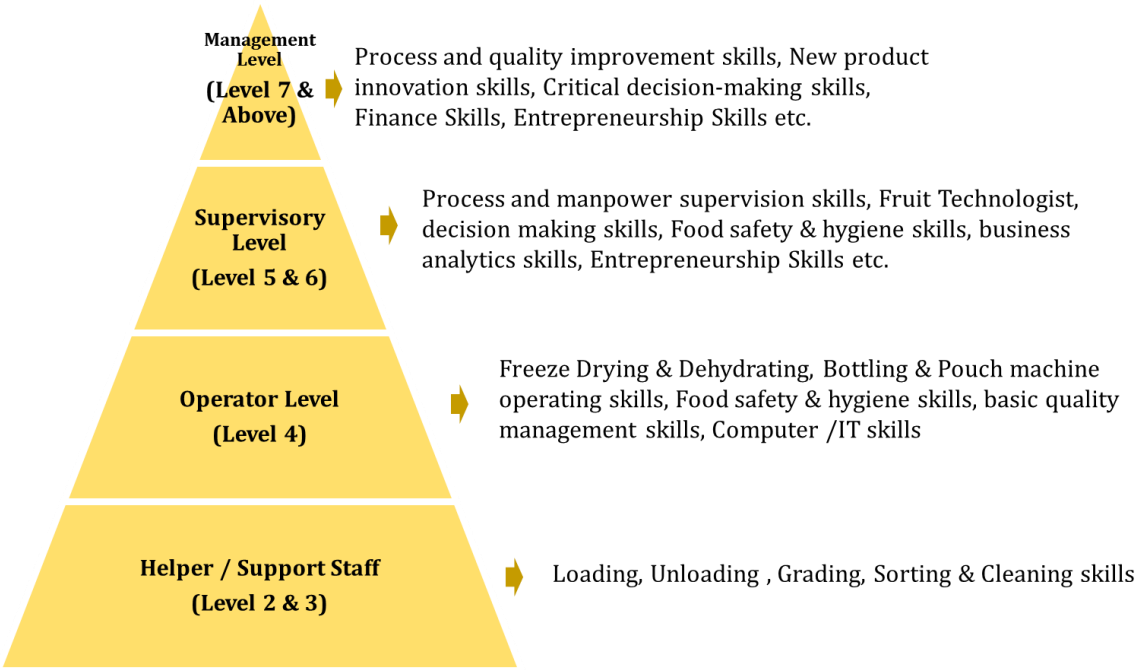


Figure 78: *Skill Sets required across multiple levels in the sector*

9.8 Expectations from the Industry Stakeholders

Need for highly trained Fruit technologist & agronomist

- The industry current lacks 'Fruit technologist' who can play a major role in developing new products for the market
- Agronomist role, is most critical role who can understand the details on the plant and the pesticide usage, but is also aware of the rules and regulations for the international markets

Requirement for training on multiple techniques used in F&V processing

- There are multiple technologies that are used in the F&V processing like Freeze drying, dehydrating, canning, packaging, etc.
- A trained worker who has the knowledge about all these techniques along with the basic understanding of the F&V process (sorting, grading, tip cutting, etc.) would be really helpful for the industry

Training Programs

- The industry is witnessing an increased application of innovative technology to increase productivity. Artificial intelligence (AI) is being implemented to examine fresh fruits and vegetables for defects, and accurately predict the exact date of decay. Nanotechnology is aiding in maintaining the freshness of perishables.
- Furthermore, grading robots are used to evaluate the quality of the produce to minimize manual errors. Cold plasma, high-pressure processing, irradiation, and radio frequency

identification (RFID) are technologies that are mostly used in the fruit and vegetable industry in India.

- With this technology currently being implemented by the industry; it is more important that existing employees in the sector need upskilling and the freshers needs to be trained with this technology.

Visibility of Training Institutes offering technicians

- Industries are aware of various training programs designed by FICSI for Juice Processing, Jams/ Pickle / Dehydration / canning / ketchup processing etc. The challenge the industry face is to source the trained manpower for F&V processing.
- It is expected that more institutes are to be operated across F&V producing belts (primarily Maharashtra) and these institutes are expected to have presence in Tier 2 cities for better reach.

Higher Emphasis on 'Food Safety' & Hygiene Related Programs

- 'Food Safety' should be the first and foremost subject, to be trained for any person getting employed in the F&V processing
- Prospective workers also need to be trained on how to handle products and the steps involved in food processing.

Chapter 10: Sub-Sectoral Analysis – Meat & Poultry Processing

10.1 Market summary

India has the world's highest population of livestock. The livestock population in the country is estimated at about 515 millions of which cattle population stands at around 200 million. The poultry population is estimated at 750 million . India accounts for 55% and 16% of the world's buffalo and cattle populations respectively. The country ranks first in goat and buffalo, second in sheep and cattle, and eighth in poultry populations in the world. Yet, the meat and poultry processing industry does not find any place in the global reckoning. The reason can be traced to our large vegetarian population estimated to be over 70% and hence the domestic market is restricted. The other reason is inadequate or even absence of cold chain infrastructure to distribute the meat and meat products within the country. In the domestic market, meat would mean only goat meat and poultry would only mean chicken. The beef in India is only buffalo meat as cow slaughtering is now banned and thus not sold in the domestic market and not slaughtered for international trade. Based on type of processing, the meat market is segmented into a chilled processed meat, frozen processed meat, canned/preserved meat and meat products. It has been reported that only 6% of poultry meat and 2% buffalo meat are processed in the organized sector in India. Chilled processed meat is expected to show strong growth in the upcoming times. This is mainly due to an increase in demand for a quick meal that also scores well on the nutrition scale. The meat processing industry is still in its infancy and there is vast scope for processing. Poor infrastructure, limited investments and lower product acceptance in the market are the key reasons for low level of mat processing in India.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	1,752
No. of registered units	210
Past Growth rate (CAGR) (FY' 15 – FY' 20)	7.8%
Total Number of Employees (FY' 20)	31,296 nos.
Overall Exports (FY'20)	INR 23,375 Crs.
Expected Market ('000 MT) FY' 2030	5,024
Future growth rate (FY' 20 – FY' 30)	11.1%
Total Employee Estimation (FY' 30)	92,651 nos.
Overall Employment Additions (FY' 20 – FY' 30)	61,355 nos.

Table 68: *Meat & Poultry Processing: Key Industry Indicators*

10.2 Present State of the Industry & Future Outlook

India has the world's highest population of livestock. The livestock population in the country is estimated at about 515 millions of which cattle population stands at around 200 million[30].

The poultry population is estimated at 750 million[31]. India accounts for 55% and 16% of the world's buffalo and cattle populations respectively. The country ranks first in goat and buffalo, second in sheep and cattle, and eighth in poultry populations in the world.

Yet, our meat and poultry processing industry does not find any place in the global reckoning. The reason can be traced to our large vegetarian population estimated to be over 70%, the domestic market, therefore, is restricted. The other reason is inadequate or even absence of cold chain infrastructure to distribute the meat and meat products within the country.

In the domestic market, meat would mean only goat meat and poultry would only mean chicken. The beef in India is only buffalo meat as cow slaughtering is now banned and thus not sold in the domestic market and not slaughtered for international trade.

Of all different types and sources of meat in India, poultry is the largest source of meat contributing about 50% of all meat production and consumption and buffalo meat is about 20% of the total[32].

Poultry meat is the major source of meat for domestic consumption whereas buffalo meat which is exported as beef is the major source of meat in international trade. Nearly four million tons of poultry meat was produced in India for the year 2018-19[33].

The largest pig producing state in the country is Assam. Pig meat is only 6.5% of the total meat source and consumption in the country. Goat meat is another major constituent of total meat consumption in the country. It is estimated that goat contributes about 14.5 % of the total meat production in India[34]

Based on type of processing, the meat market is segmented into a chilled processed meat, frozen processed meat, canned/preserved meat and meat products. Chilled processed meat is expected to show strong growth in the upcoming times. This is mainly due to an increase in demand for a quick meal that also scores well on the nutrition scale. It also eliminates one of the key concerns in the meat sector of India - Quality & Hygiene. The advantage that chilled processed meat market offers, is enhanced quality and supreme hygiene levels, conducive to good health and nutrition.

Key players in Meat and Poultry processing in India

Meat Processing

A large number of processors are present in Uttar Pradesh and Maharashtra state, who are regular exporters of fresh frozen meat as well as processed meat products.

[30] APEDA
[31] Poultry Federation of India
[32] APEDA
[33] Poultry Federation of India
[34] APEDA

Some of them have also established their own brands and cold chain network in the domestic market. Popular amongst them are Lazzez, Al Kabeer, Al Sami, Al Nasir, etc.

Frozen Buffalo meat is exported by established processors including Allanasons which acquired an abattoir from Brook Bond in the early eighties which had a capacity to slaughter 500 Buffaloes every day[35]. This is an integrated plant and everything from the animal is used for the productive purpose including blood and skin.

They are one of the large frozen and chilled meat exporters in the country. They have their own network of dealers and distributors for its products in the Middle East and thus having an edge over others.

Pig meat is not widely sold in India except in markets of the north-eastern part of the country. The largest pig production and consumption is also in this part of the country. Star hotels serve the pig meat products like sausages and salamis, but mostly have their own small processing units. Pig rearing is not done in an organized fashion. However, of late, a plant has come up near Guwahati, in Assam, to process and sell Pig meat.

Poultry Processing

There are many players in poultry processing. The biggest player is Venky's which has an all-India network and also have modern integrated facilities and process plants.

Many smaller poultry farms spread across the country source Chicks from Venky's hatchery to grow and finally sell in their locality.

Godrej Agrovet has also set up a modern poultry processing plant in Mumbai, in a joint venture with Tyson Foods of US, which has 51% equity in the venture to form Godrej Tyson Ltd to produce both frozen dressed chicken, chicken portions such as legs and breasts, as well as chicken snacks.

APEDA Registered Meat Processing Plants

The animal slaughtering takes place both in registered as well as unlicensed/unregistered slaughterhouses.

As per the estimate available, the total number of slaughterhouses in the country is around 3600 and out of which only around 1,700 are registered and the remaining are unlicensed and unregistered.

The number of small-scale meat retail shops are 25,000 and the number of abattoirs with meat processing facilities approved by APEDA are 68[36].

[35] Primary Interviews with Meat Processing Companies
[36] APEDA

APEDA Registered Meat Abattoirs & Processing Plants

State	APEDA Registered Meat Processing Plants	APEDA Registered Integrated Abattoirs Cum Meat Processing Plants
Uttar Pradesh	15	37
Maharashtra	6	12
Andhra Pradesh	2	2
Telangana	2	4
Haryana	1	3
Rajasthan	1	-
Karnataka	1	-
Punjab	-	5
Bihar	-	4
Kerala	-	1
Total	**28**	**68**

Table 69: APEDA Registered Meat Abattoirs & Processing Plants

Source: APEDA

Manufacturing Clusters

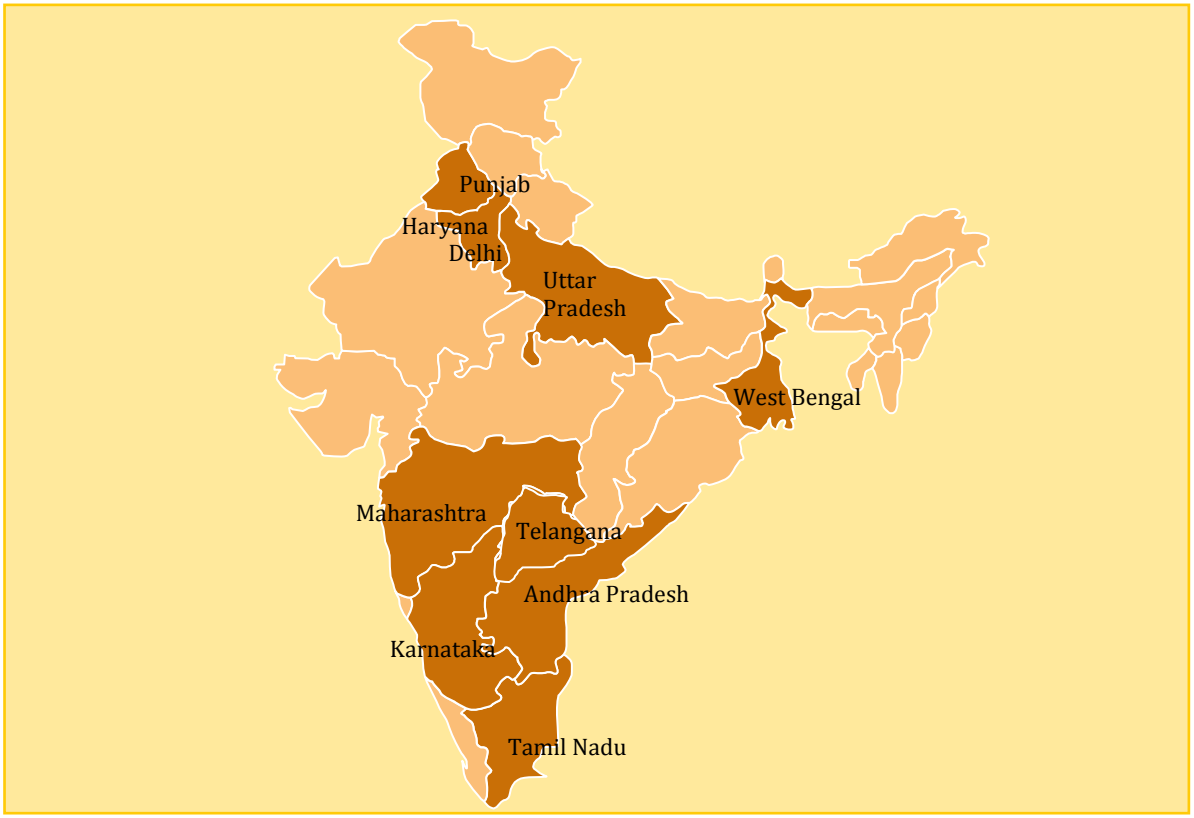


Figure 79: Manufacturing Clusters

Top 10 states account to 97% of total employment in the Meat & Poultry Processing industry

Market Overview

Buffalo Meat Industry

India has consistently retained the number one position in the world for buffalo population, buffalo meat and milk production for the past several years. Buffalo meat export in India accounts for more than 95% of total meat exports.

Since the year 2010, the unit value of buffalo meat has substantially increased from Rs. 110 to Rs. 195 per kg. during the year 2019

Sheep and Goat Meat Industry

The country is the largest exporter of sheep & goat meat to the world. The country has exported 18,425 MT of mutton and chevon for the worth of Rs. 790.65 Crores during the year 2018-19 (APEDA, 2020).

Sheep / Goat meat are the premium meats in India, being sold at more than Rs. 400-500 per kg across the country. Most of the edible by-products produced from sheep and goat are also marketed and consumed in India. Hence, the wastage is minimal.

Poultry Meat Industry

The production in the poultry sector, comprising of breeding, hatcheries and feeding operations in India is organised with complete vertical integration. But the marketing of broilers, involving slaughtering, distribution and retailing is still highly unorganised with the predominance of wet market business.

Only 11% of poultry meat in India is produced from poultry processing plants, which include more than 21 large (>1000 birds per hour(BPH) capacity) and around 20 smaller (<1000 BPH) units. The rest 89% of the poultry meat in India is produced under wet market conditions through highly scattered roadside poultry processing plants.

Pig Meat Industry

Among the various livestock species, Pig is the most potential source of meat production and more efficient feed converter after the broiler. Around 150 meat processing plants which are mainly processing pork and pork products like sausages, bacon and ham are functioning on small scale in the private sector in India.

The total requirement of pork in India would be around 0.93 million tons against the present (FY 20) pork production of 0.437 million tons. Thus, the present shortfall of pork in the country is about 0.50 million tons.

No. of Animals slaughtered for Meat ('000 Nos. - Per Annum)[37]

Species	FY'18	FY'19
Cattle	3,410.18	3,055.84
Buffalo	11,337.19	11,926.27
Sheep	46,216.23	50,863.58

[37] Basic Animal Husbandry Statistics

Species	FY'18	FY'19
Goat	93,917.18	97,190.24
Pig	10,903.06	10,734.89
Poultry	25,44,299.00	28,12,839.00

Table 70: *No. of Animals slaughtered for Meat ('000 Nos. - Per Annum)*

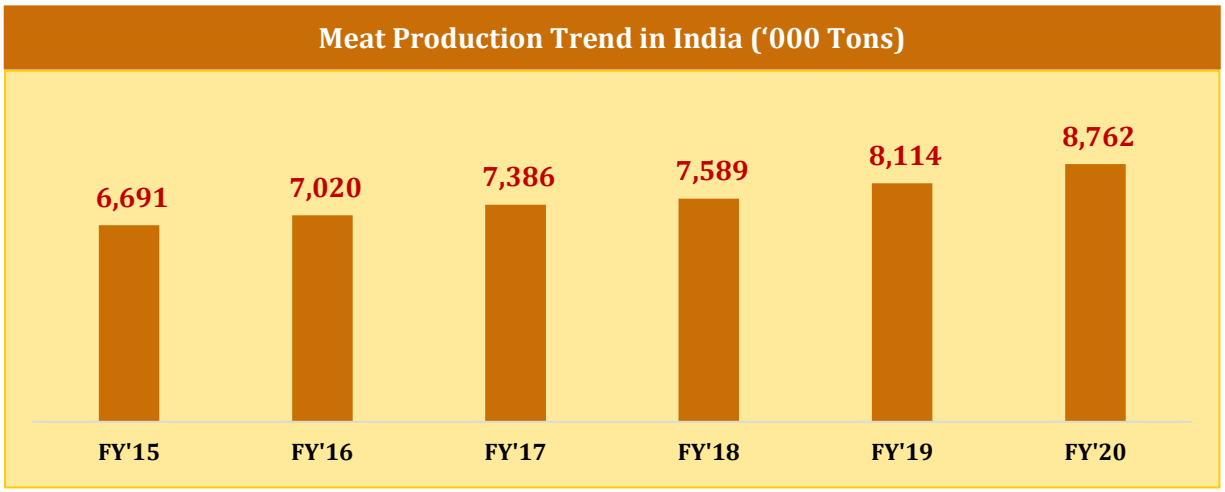


Figure 80: *Meat Production Trend in India ('000 Tons)*

Source: Basic Animal Husbandry Statistics-2019; Subject Matter Expert

The total processing capacity in India is over 1 million tons per annum, of which 40-50 percent is utilized. India exports about 2 Mn tons of animal products, mostly Buffalo meat.

The meat production has registered a healthy growth. India currently processes only 6 % of poultry and 21 % of buffalo live stock. Pork and Poultry meat are used for production of ham, sausages, patties etc., for the elite market.

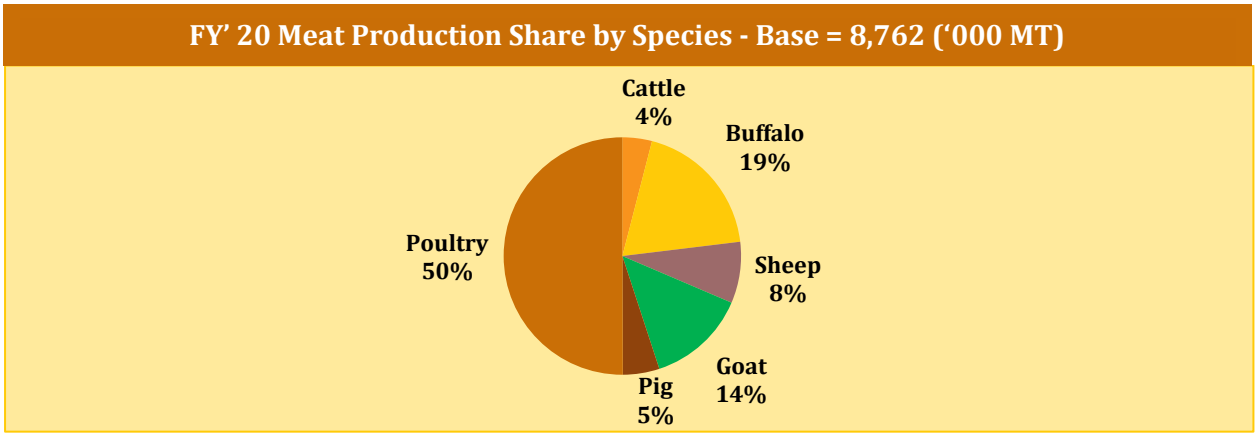


Figure 81: *FY'20 Meat Production Share: by Species*

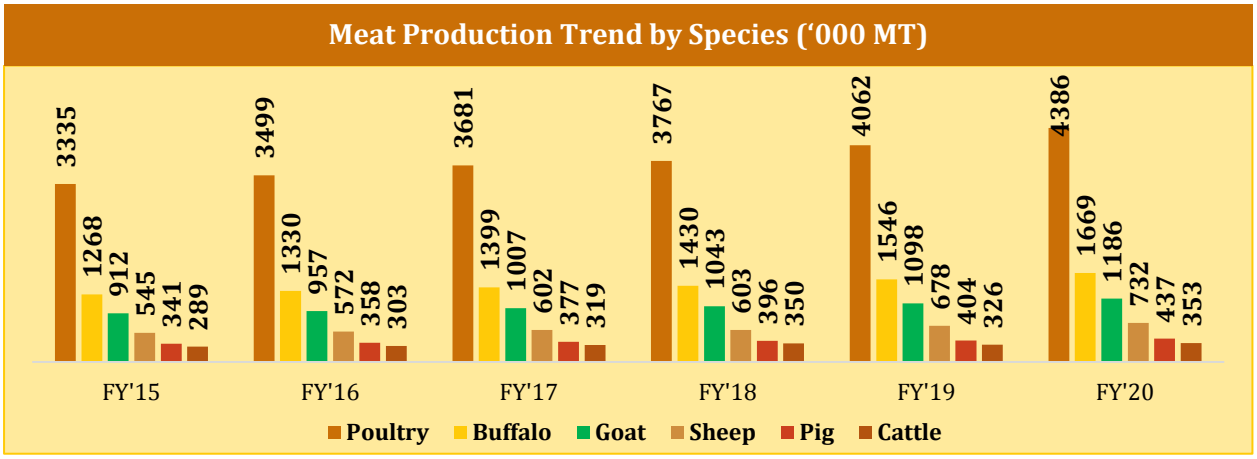


Figure 82: *Meat Production Trend by Species ('000 MT)*

Source: Basic Animal Husbandry Statistics-2019; Subject Matter Expert

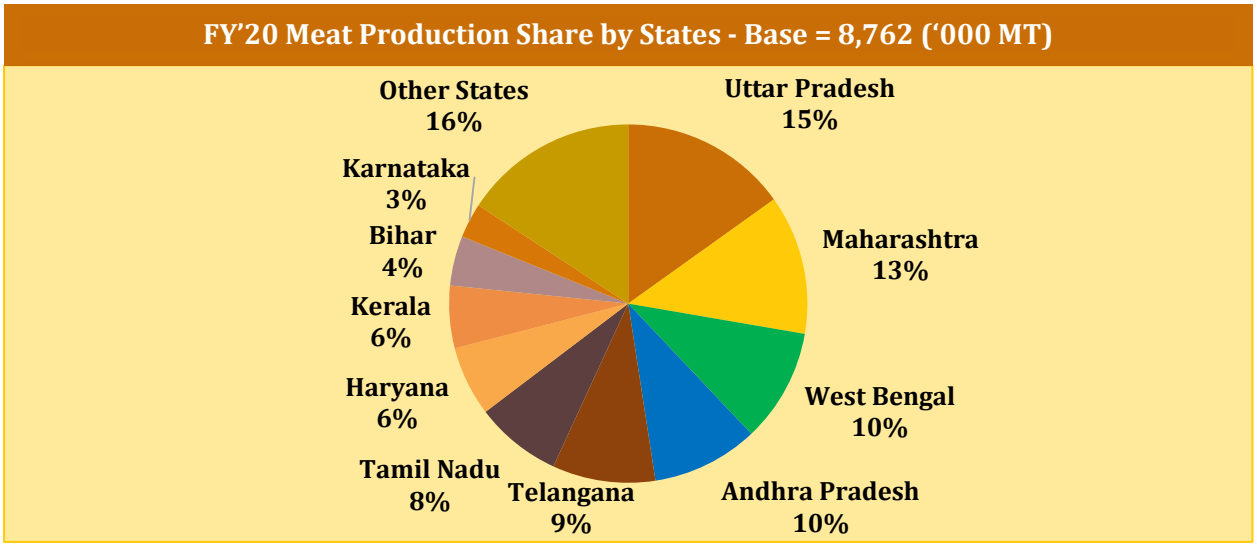


Figure 83: *FY'20 Meat Production Share: by State*

Source: Basic Animal Husbandry Statistics

10.3 Present employment scenario & analysis

Category of the companies by Revenue

Category of the Company	Definition (Revenue Range)	Remarks
Micro Enterprises	< Rs 5 Cr	• Micro enterprises are primarily small-scale meat & poultry processers. Primarily deals with non-Buffalo meats
Small Enterprises	RS 5 – 50 Cr	• Small enterprises would typically deal with poultry products
Medium Enterprises	Rs 50.1 – 250 Cr	• Medium-Sized Enterprises predominantly have multiple product presence among non-buffalo meat or completely buffalo meat exports.

Category of the Company	Definition (Revenue Range)	Remarks
Large Enterprises	> Rs 250 Cr	• Large Sized Enterprises are organized players focusing exports and other domestic market

Table 71: Category of the Companies by Revenue

10.3.1 Sample Coverage by Categories of Companies & Region

Category of the Company	Sample Coverage (N)	East	West	North	South
Micro Enterprises	**52**	**19%**	**25%**	**38%**	**17%**
Small Enterprises	**31**	**23%**	**19%**	**42%**	**16%**
Medium Enterprises	**16**	**25%**	**19%**	**38%**	**19%**
Large Enterprises	**5**	**20%**	**20%**	**40%**	**20%**
Total	**104**	**21%**	**22%**	**39%**	**17%**

Table 72: Sample Coverage by Categories of Companies & Region

10.3.2 Total No. of Employees

Past Trend of employment in the Meat & Poultry Sector

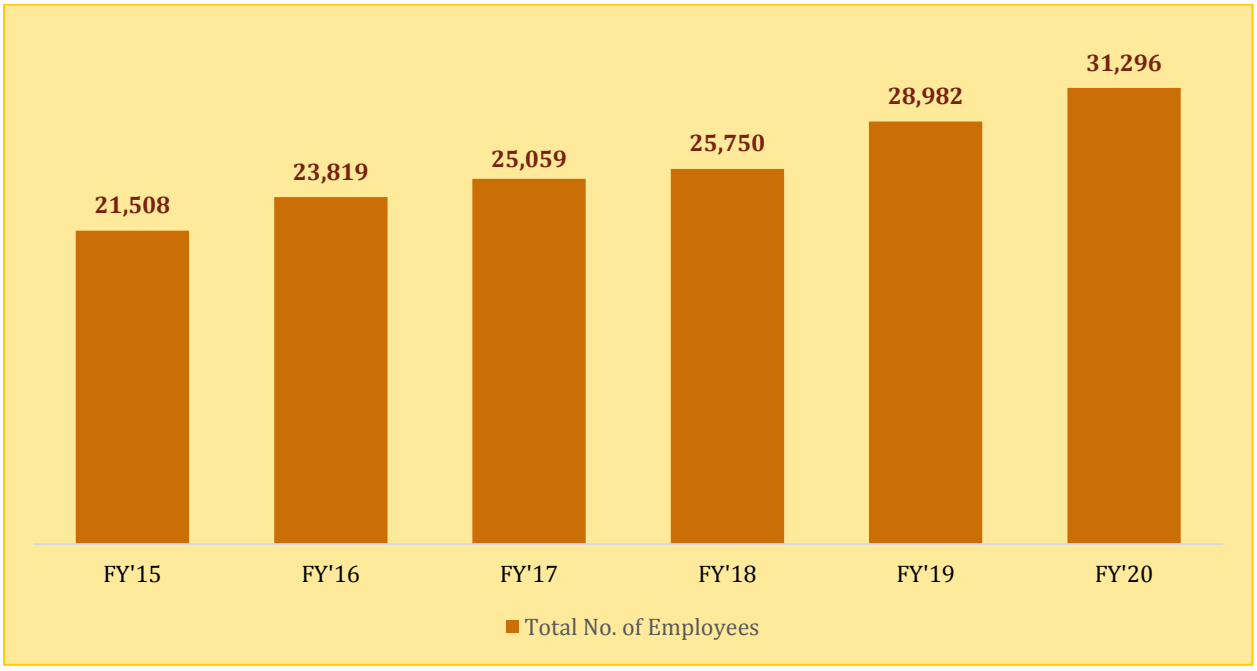


Figure 84: Past Trend of employment in the Meat & Poultry Sector

Source: Feedback Analysis

Share of Employees (FY' 20) Break by Different Category

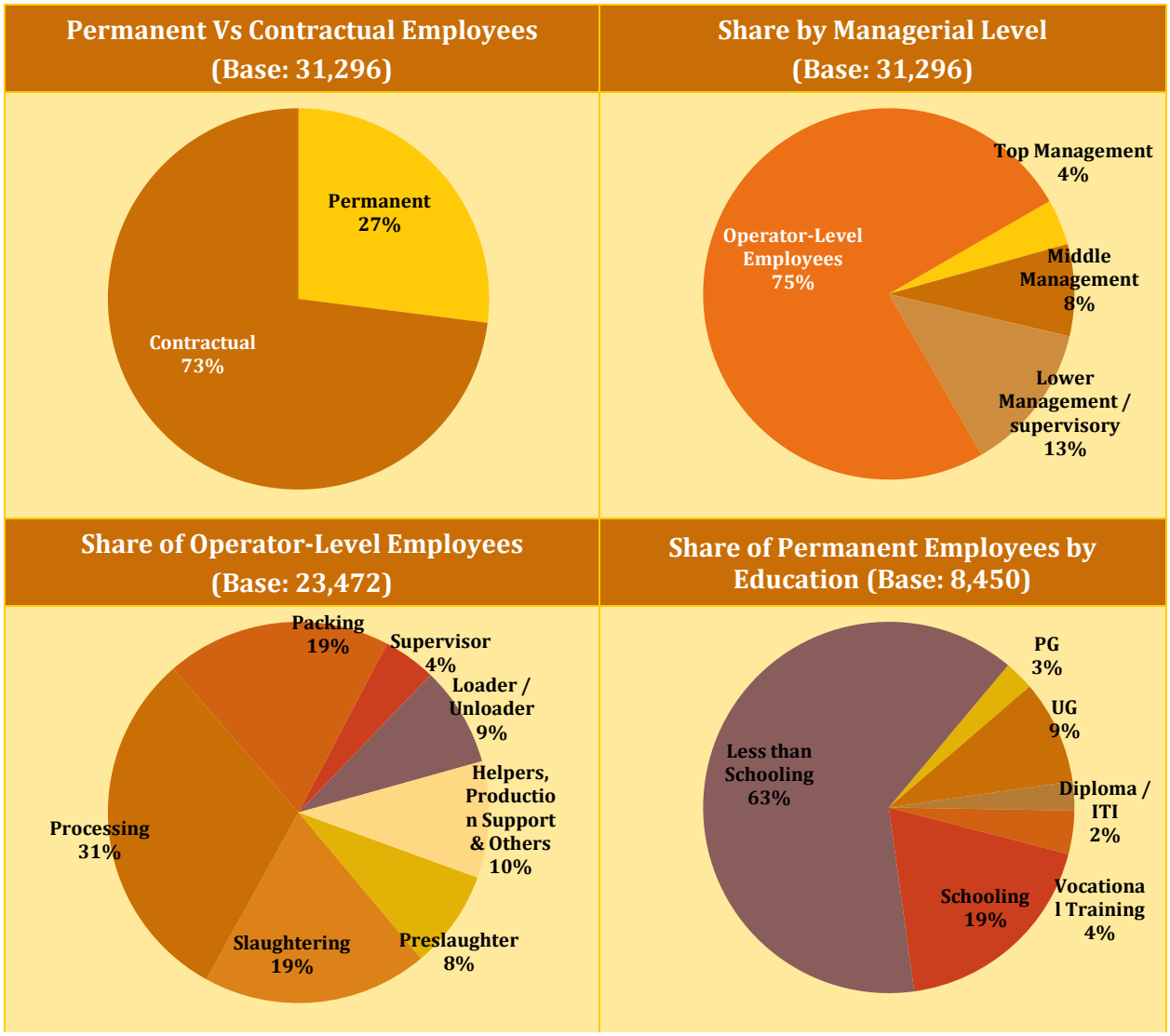


Figure 85: Share of Employees (FY' 20): By Different Category

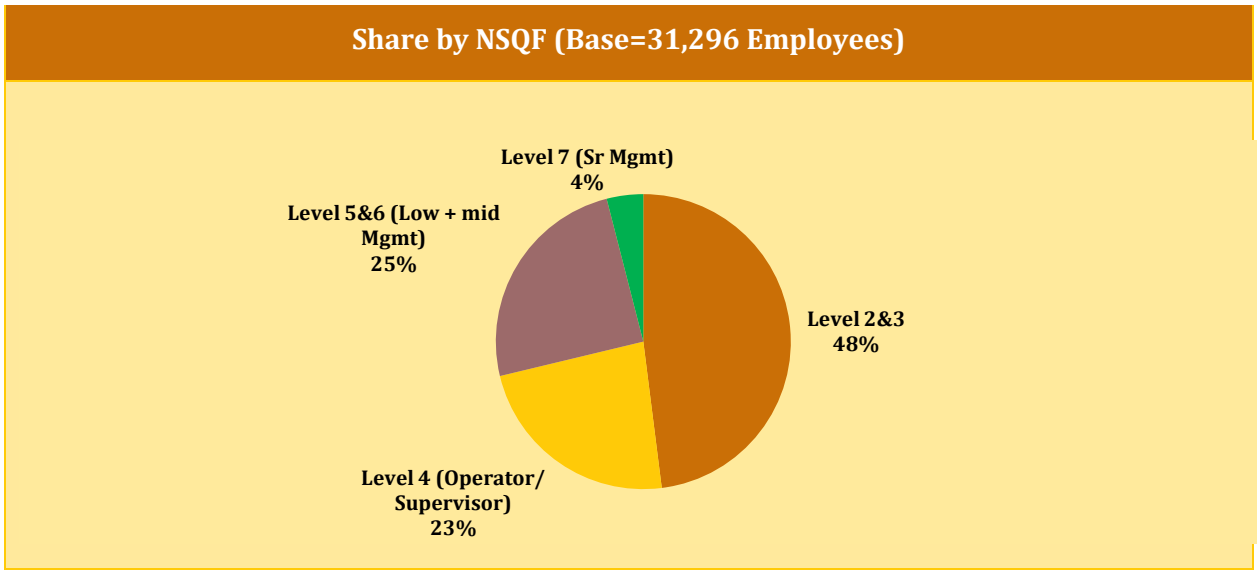


Figure 86: Share of Employees (FY'20) : By NSQF levels

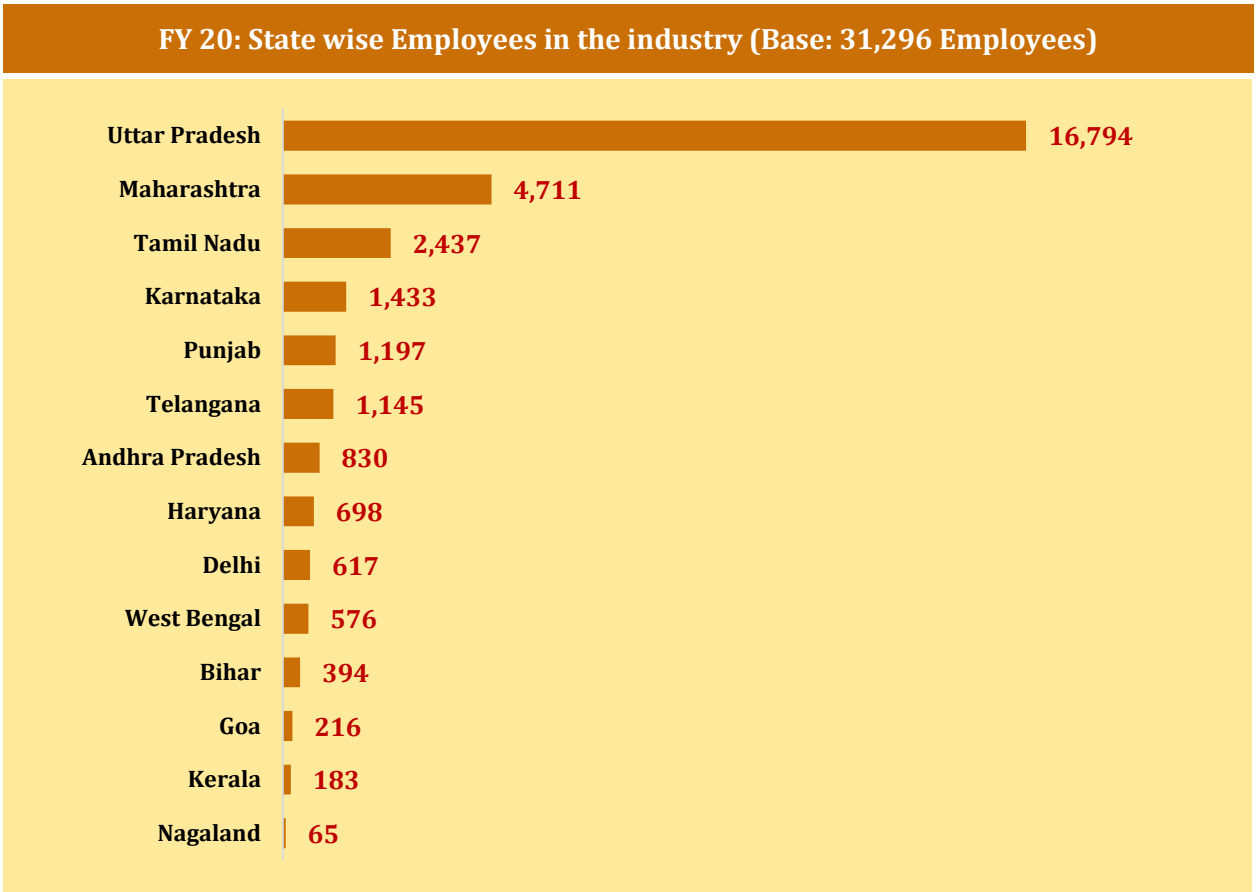


Figure 87: State wise Employees in the Industry (FY'20)

Source: Feedback Analysis

Top 14 states account to 100% of total employment in the industry

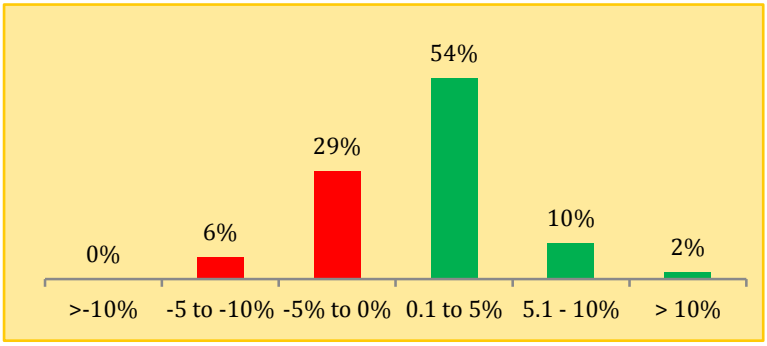
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Slaughter Person/ Butcher (Kasai)	Preparing meat in accordance with laid down procedures. Reducing meat wastage wherever possible. Ensuring a clean, safe, and organized work environment. Cutting, boning and trimming meat.	3	✓	✓	✓	
2	Poultry Preparers	Prepare poultry for further processing, for packaging or for marketing	3	✓	✓	✓	
3	Processor	Cooking or freezing or chilling of meat in	4	✓	✓	✓	✓

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
		accordance with the laid down procedures					
4	Equipment Operator	Operating slaughter machine, meat mincer, cutting machine, wrapping or packing machine, bone saw, etc.	4	✓	✓	✓	✓
5	Supervisor	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
6	Packer	Various forms of packaging	4	✓	✓	✓	✓
7	Helpers	Misc. work including cleaning plants, machinery, assist veterinary, etc.	3	✓	✓	✓	✓
8	Loader / Unloader	Material handling, loading & unloading products.	3	✓	✓	✓	✓
9	Technician	Machine maintenance	4	✓	✓	✓	✓

Table 73: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

10.3.3 Past Growth of Employees (FY'17 – FY'20)



- 35% of the enterprises have experienced degrowth in their manpower in the past 3 years.
- 54% have indicated that their manpower has grown marginally (up to 5%).

Figure 88: Past Growth of Employees (FY'17 – FY'20)

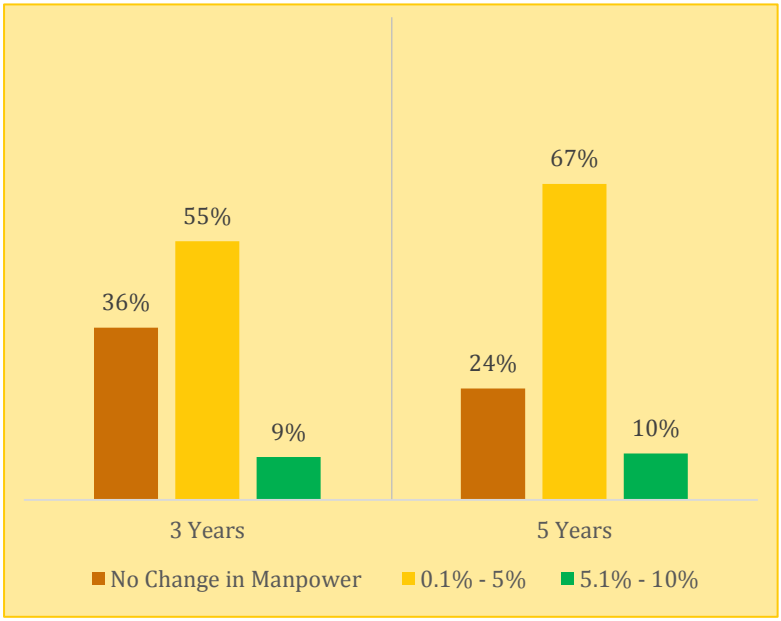
10.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Planning to invest in Internet of Things (IoT) or Automation	38%	6%	44%	80%
Plan to invest on new equipment / New Facility	0%	0%	44%	80%
Plan to enhance the production capacity	67%	13%	31%	80%
Plans to increase exports	0%	32%	0%	0%

Table 74: Future Plans of the Companies covered

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- 2% - 3% in next 3 & 5 years

Figure 89: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

Source: Feedback Analysis

10.4 Recruitment & Training Practice

Recruitment Practice

Walk-in or through references are the key source of recruiting candidates across Operational level and Lower level employees. Women employment is not a predominant practice in Meat processing. Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining various enterprises.

Employee Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal training institutes offering food technology / science
Middle Management	• Formal training institutes offering food technology / science
Lower Level Management	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 75: Recruitment Practice

Training Practice

Of the total sample covered, around 25 - 30% of the companies are providing training across levels when an employee joins the firm (On-the-Job training).

% of Companies offering training

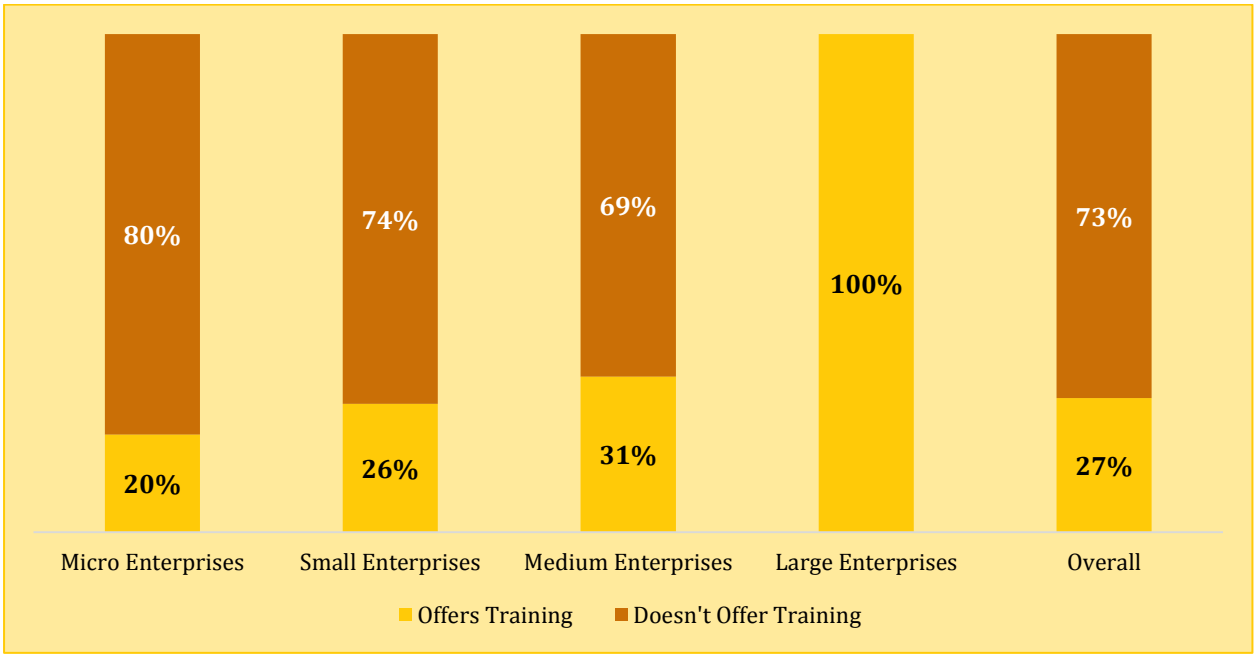


Figure 90: % of Companies offering training

Source: Feedback Analysis

Major training topics covered

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Animal health	Monitoring animal health before processing for meat. Large companies include modules on back tracking technology, DNA, etc.	Across all employees' level	✓	✓	✓	✓
Preparation for processing	Procedures for processing, wastage reduction techniques, processing techniques, etc.	Operator level employees & lower-level employees	✓	✓	✓	✓
Slaughtering techniques	Effective ways of slaughtering to reduce wastage	Operator level employees &	✓	✓	✓	✓

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
		lower-level employees				
Storage	Storage temperature required at every stage of processing	Operator level employees & lower-level employees	✓	✓	✓	✓
Product handling	Product handling across various functions (Livestock to Finished Meat product)	Across all employees' level	✓	✓	✓	✓
Operations management	Training to detail the overall operations, manpower allocation, inspection, etc.	Supervisors / Managers			✓	✓
Supervision of product handling activities	Appropriate cooling methods, packing methods, latest technology, equipment operations, etc.	Supervisors / Managers				✓
Plant maintenance	Maintenance checklist for equipment (processing and packing)	Operator level employees & lower-level employees (Technicians / Machine Operators)				✓

Table 76: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

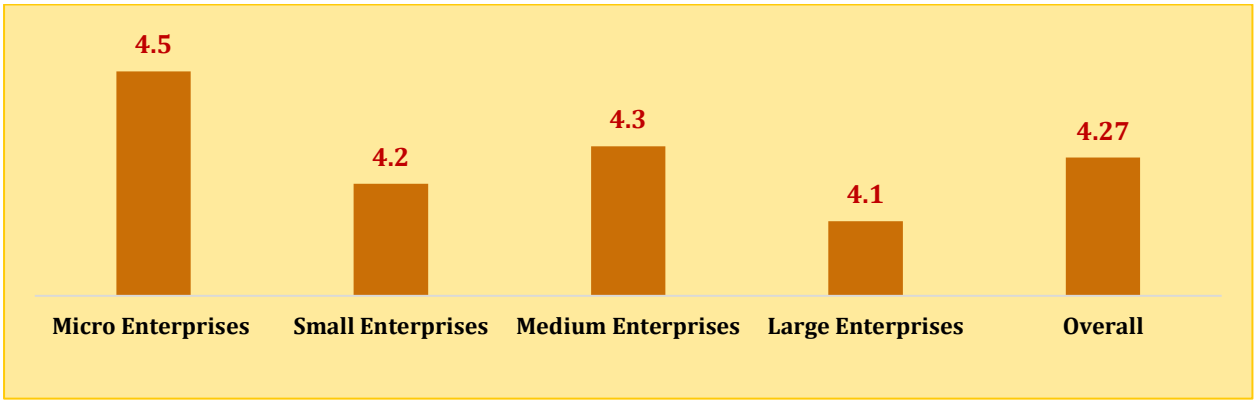


Figure 91: Effectiveness of Training

Source: Feedback Analysis

10.5 Challenges related to Skill Availability Vs Skill Gaps

Skill acquisition challenges

Key concerns raised by the Meat and Poultry processing companies in terms of acquiring the skilled manpower are as follows

- There are no accredited courses where students can be offered a diploma program in meat processing
- A few companies are dependent on migrant laborers.
- The existing training programs in vocational training institutes are limited to offal collector, butcher / processor related programs.
- Limited training institutes that are focusing meat processing related programs
- Employees are predominantly recruited through reference in this sector and are joining with limited or no prior experience in the relevant functions
- High employee attrition

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Veterinarian	Mid Management	• Ensures quality meat production by physical examination of	• Limited frequency of physical examination				✓

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
	NSQF: 6	meat including colour of meat in different food animals, abnormal colour and distribution of fat in the meat. • Chemical examination of meat • Inspection of Livestock	• Limited knowledge on the processing techniques				
Processing Manager	Mid Management NSQF: 6	• Managerial Skills • Operating Machines • Understanding the technology and adaptation to newer technologies	• Ability to work with both the processing and packaging equipment • Training manpower at the lower level or operator level	✓	✓	✓	
Quality Control	Mid Management NSQF: 5	• Visual examination skills of the cut meat color • Assessing the quality for the finished products	• Lack of visual examination skills		✓	✓	✓
Butcher	Lower-Level Management NSQF: 3	• Meat cutting based on required procedures	• Lack of uniformity in cutting (Size / weight) • Lack of Hygiene practice • Higher wastage	✓	✓	✓	
Shift Supervisor / Supervisor	Lower-Level Management NSQF: 5	• Overseeing operations including Pre-processing, processing, packaging, and	• Lack of technical knowledge on storage practice • Best practices w.r.t material handling to reduce wastage	✓	✓	✓	✓

Job Roles	Managerial Level & NSQF	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
		dispatch of the products • Equipment operations and maintenance • Manpower planning	during material handling				
Maintenance Officer	Lower-Level Management NSQF: 4	• Knowledge on transformation from analogue to digital business model • Domain Skills	• Not updated as per technology change	✓	✓	✓	✓
Loading / Unloading Labors	Operator Level Employees NSQF: 3	• Materials handling	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	✓
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygiene awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓	✓	✓

Table 77: Key job roles and their required skills and skill gaps

10.6 Future Projection – Sector & Employment

Projected growth in Meat & Poultry production in India

Based on discussions conducted with the Visionaries and Industry experts, Indian Meat production likely to reach approx. 15 - 16 Mn tons by FY'30. This indicates CAGR of approx. 6%. Reasons for such growth are the followings:

- Introduction and acceptance of value-added products like frozen/chilled products, RTC/RTE, Indian ethnic products, etc.
- Increase in the disposable income has led to tremendous increase in the poultry demand and a steady increase in consumption over the years.

- While demand from high-end hotels, restaurants and retailers is driving imports of pork products to India, there is also a separate but significant market for locally produced pig meat in the north-eastern states - which include Assam, Nagaland, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim, and Tripura - as well as in Bihar, Jharkhand, West Bengal, Goa, and Kerala.
- India's per-capita consumption of meat stands at 4.4 kg per person compared to global average of 33.7 kg per person. This makes India as one of the least meat consuming countries in the world. According to SMEs, India's per capital meat consumption likely to see healthy growth in this decade and may reach approx. 9 - 10 kg.

Year	Production ('000 Tons)	Y-o-Y Growth
FY'20	8,762	
FY'21 (E)	9,250	5.6%
FY'22 (E)	9,800	5.9%
FY'23 (E)	10,400	6.1%
FY'24 (E)	11,000	5.8%
FY'25 (E)	11,600	5.5%
FY'26 (E)	12,350	6.5%
FY'27 (E)	13,100	6.1%
FY'28 (E)	13,900	6.1%
FY'29 (E)	14,800	6.5%
FY'30 (E)	15,700	6.1%

Table 78: Future Trend in Meat & Poultry production in India

Source: Interactions with SMEs & Visionaries

Future trends and likely share of the Organized sector

Year	Production ('000 Tons)	Processing Level*	Processing Volume ('000 MT)
FY'20	8,762	20%	1,752
FY'21 (E)	9,250	22%	2,035
FY'22 (E)	9,800	23%	2,254
FY'23 (E)	10,400	24%	2,496
FY'24 (E)	11,000	25%	2,750
FY'25 (E)	11,600	26%	3,016
FY'26 (E)	12,350	27%	3,335
FY'27 (E)	13,100	28%	3,668
FY'28 (E)	13,900	29%	4,031
FY'29 (E)	14,800	31%	4,588

Year	Production ('000 Tons)	Processing Level*	Processing Volume ('000 MT)
FY'30 (E)	15,700	32%	5,024
CAGR	6.0%		11.1%

Table 79: Future trends and likely share of the Organized sector

Source: Interactions with SMEs & Visionaries

**Note: Visionaries, industry experts and SMEs feel that share of Organized sector likely to reach to approx. 32% by FY'30 from the current 20%.*

- In a common non-vegetarian diet in India, meat is regarded as a valuable component and an important source of protein. The meat availability in India is only about 15 gms / person / day against the ICMR recommendation of 30 gms / person / day.
- The meat processing industry is still in its infancy and there is vast scope for processing. Poor infrastructure and investment are hindrances in the level of processing in India. It has been reported that only 6% of poultry meat and 2% buffalo meat are processed in the organized sector in India.
- India is becoming a major buffalo meat producing country and will be a main player in the international market with additional establishment of the state-of-art-abattoirs cum meat processing plants.

Processing capacity and investment requirement to achieve the above processing levels

Parameter	Unit	Overall Production
FY'20 Production	'000 MT	1,752
FY'30 Production (E)	'000 MT	5,024
Increase in production between FY'20 & FY'30	'000 MT	3,272
Considering 80% capacity utilization, additional processing capacity required	'000 MT	4,089
Investment norm	Rs. / MT	30,000
Total Investment required	**Rs. Cr.**	**12,268**

Table 80: Processing Capacity Requirement and investment required in the sector

Source: Discussion with Plant & Equipment Manufacturers & SMEs

- The Indian government announced a new infrastructure fund of Rs. 15,000 Cr. during June 2020 for the benefit of individual entrepreneurs, micro, small and medium enterprises (MSMEs), farmer producer organizations (FPOs) to enable them to set up dairy, poultry, and meat processing units.
- For a semi-automatic Buffalo slaughter line with 50 - 100 animals per day, total investment would be around 6 - 7 cr.

- Meat processing is one of the key sectors under the PLI Scheme announced for Food processing sector.

Select ongoing and upcoming projects in Meat & Poultry Processing industry in India

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Allanasons Pvt. Ltd.	Punjab Meat Processing Facility Project	Punjab	New Unit	125
2	Venky's (India) Ltd.	Panjehra Poultry Processing Unit Project	Solan, Himachal Pradesh	New Unit	47
3	West Bengal Livestock Processing Devp. Corpn. Ltd.	Phansidewa Meat (Chicken and Pork) Processing Plant Project	Darjiling, West Bengal	New Unit	36
4	Meat Products of India Ltd.	Meat Processing (Chalakkudy) Project	Chalakkudy, Kerala	New Unit	32
5	Srinagar Municipal Corpn.	Srinagar Abattoir Project	Srinagar, Jammu & Kashmir	New Unit	25
6	Municipal Corporation of Faridabad	Faridabad Abattoir project	Faridabad, Haryana	New Unit	22
7	Venkateshwara Hatcheries Pvt. Ltd.	Hasugavalli Poultry & Poultry Product Manufacturing Unit Project	Hassan, Karnataka	New Unit	22

Table 81: Select ongoing and upcoming projects in Meat & Poultry Processing industry in India

Source: CMIE & Projects Today

FY'20 employment estimation in Meat & Poultry Processing Industry in India

Company Category	Average no. of Employees	FY'20 Total No. of Employees in Meat & Poultry Sector	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	675	16,875	60%	1,051	62.3
Medium Enterprises	182	8,736	25%	438	50.2
Small Enterprises	75	3,900	10%	175	44.9

Company Category	Average no. of Employees	FY'20 Total No. of Employees in Meat & Poultry Sector	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Micro Enterprises	21	1,785	5%	88	49.1
Total		**31,296**		**1,752**	**56.0**

Table 82: FY'20 employment estimation in Meat & Poultry Processing Industry in India

**Source: Discussion with the Meat Processing Units, APEDA and SMEs*

Note: LMS classification has been made based on overall revenue of the companies. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection in Meat & Poultry Processing industry in India

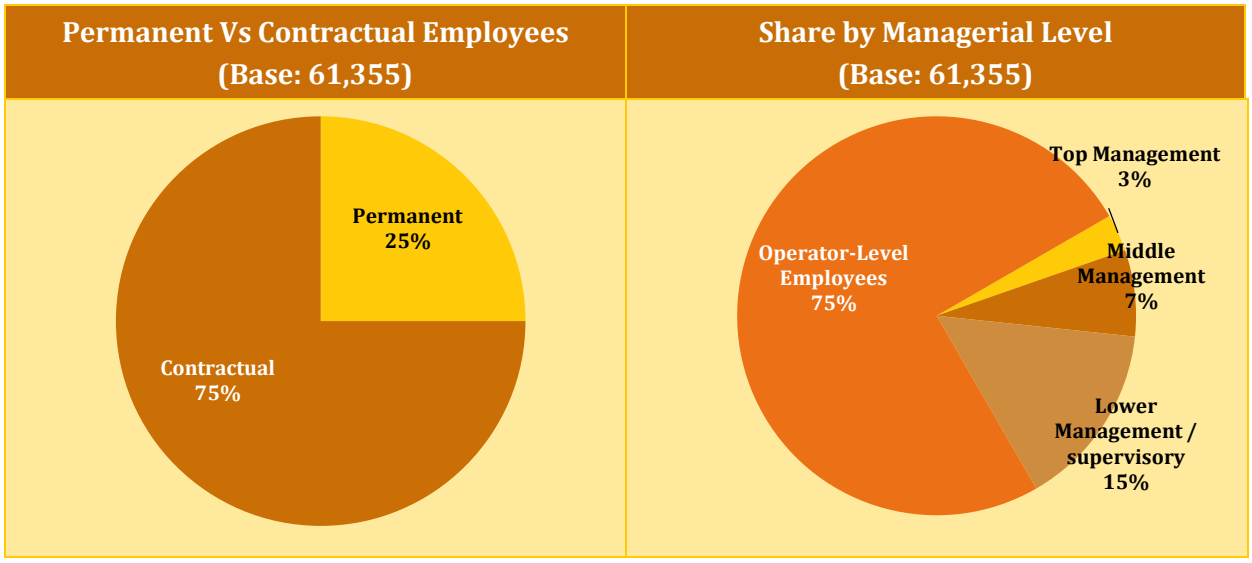
Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	45%	2,261	62.3	36,283	19,408
Medium Enterprises	40%	2,010	50.2	40,071	31,335
Small Enterprises	10%	502	44.9	11,180	7,280
Micro Enterprises	5%	251	49.1	5,117	3,332
Total		**5,024**	**54.2**	**92,651**	**61,355**

Table 83: Future employment projection in Bread & Bakery products industry in India

**As per discussion with the Meat Processing Units, APEDA and SMEs, contribution of various types of companies in the Meat & Poultry processing industry will remain same over next 10 years*

 # Based on discussions with equipment manufacturers and SMEs, there could be marginal adoption of automation / industry 4.0 in the coming years. However, that will have negligible impact on the productivity of the employees. Hence, the same productivity values have been considered for future employment generation potential.

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category



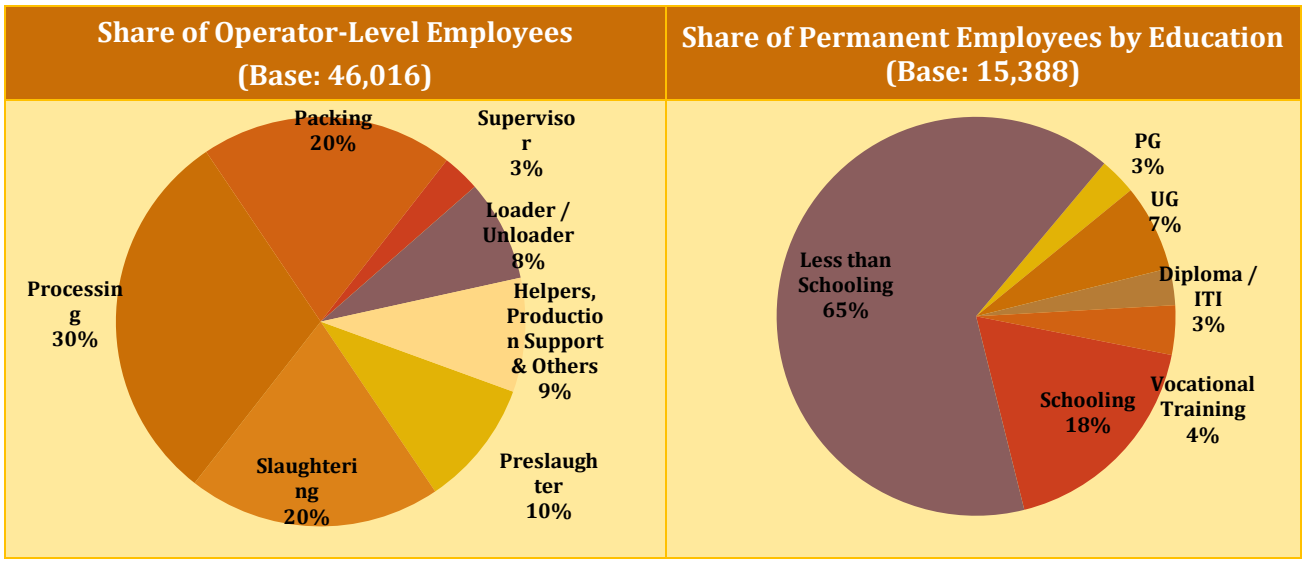


Figure 92: Share of FY'20 - FY'30 Employment Generation potential : By Different Category

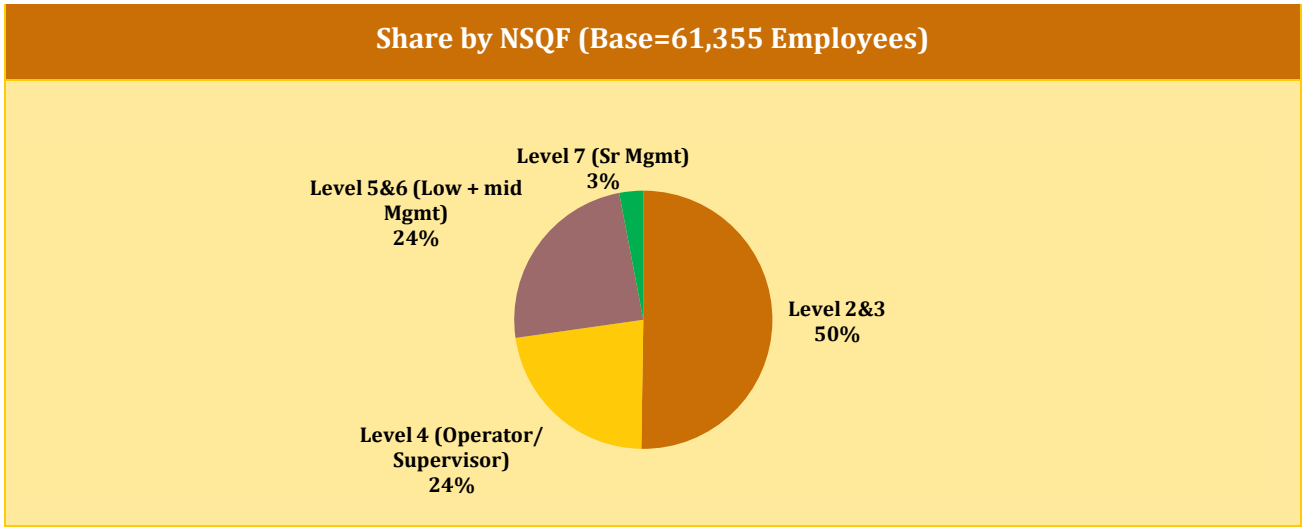


Figure 93: Share of FY'20 - FY'30 Employment Generation potential :By NSQF levels

Source: Feedback Analysis

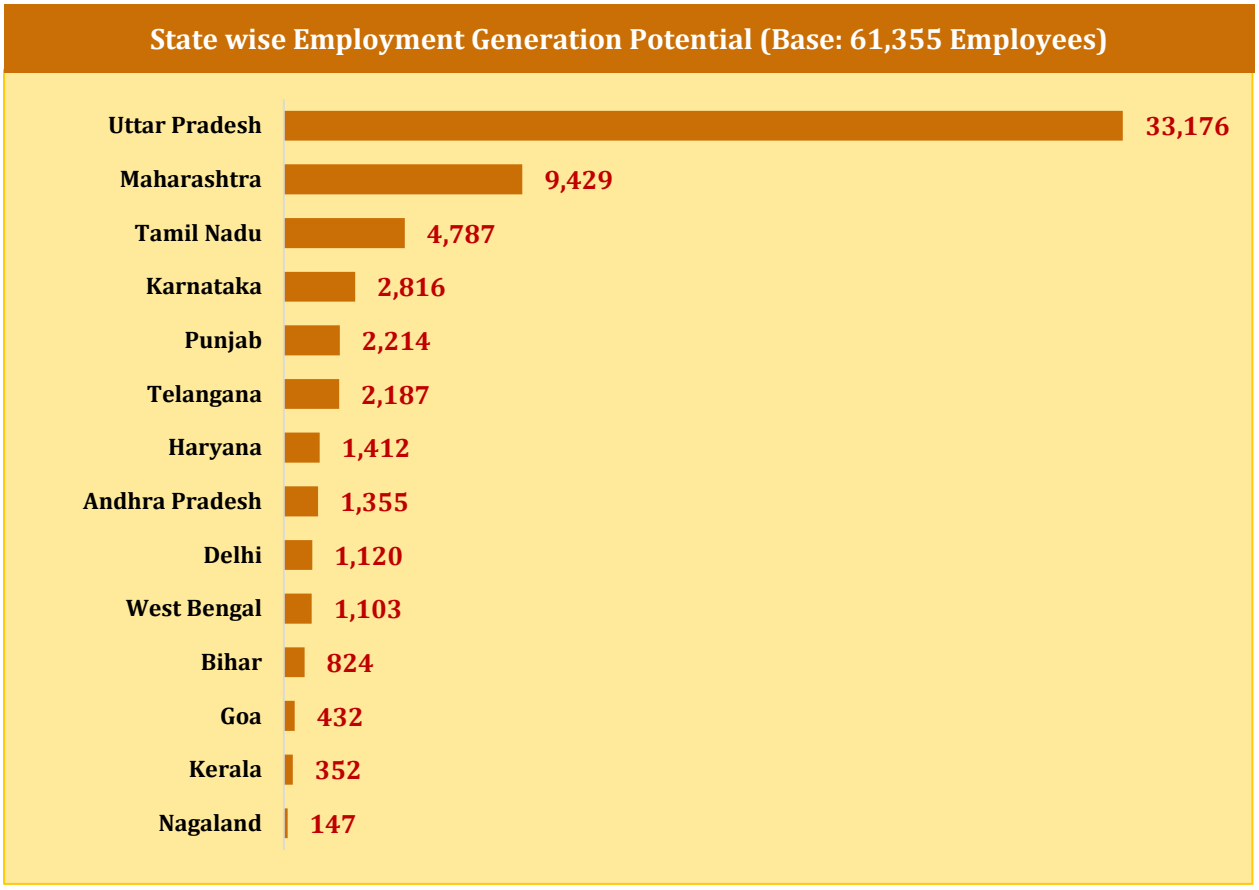


Figure 94: State wise Employment Generation Potential

Source: Feedback Analysis

Top 14 states account to 100% of total employment in the industry

10.7 Existing & emerging prominent job roles which requires Skilling

Following are the specific existing and emerging prominent job roles that will create employment opportunities in Meat & Poultry Processing Sub-sector in future.

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner /	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for	**A Helper / Floor Cleaner / Loader & Unloader must be able to:**	✓	✓	✓	

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
Loader & Unloader		carrying out various labor-intensive activities such as loading/unloadin g and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	• Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.				
Animal Attendant	3	An Animal Attendant is responsible for providing daily care to animals under supervision such as preparing their feed and feeding them, cleaning/ bathing them, treating wounds or administer medication under veterinary supervision, etc.	**An Animal Attendant must be able to:** • Prepare animal feed and feed them. • Treat wounds and administer medication under veterinary supervision. • Prepare and maintain animal enclosures, ensuring hygiene. **An Animal Attendant must know and understand:** • How to prepare different types of animal feed and feed the animals. • Applicable health and safety standards. • Process of treating animal wounds and administering them medication.		✓	✓	✓
Meat & Poultry	3	A Meat & Poultry Pre-processor is responsible for carrying out	**A Meat & Poultry Pre-processor must be able to:**	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
Pre-Processor		relevant meat and poultry pre-processing activities under supervision such as cleaning, curing, storing, etc.	• Clean the meat and poultry products appropriately. • Cure the meat and poultry products following the recommended methods under supervision. • Store the pre-processed meat and poultry products appropriately. • Follow the applicable food hygiene and safety standards. **A Meat & Poultry Pre-processor must know and understand:** • Applicable food and personal safety standards. • Process of cleaning and curing meat and poultry products. • Appropriate conditions for storing meat and poultry products.				
Deboning & Slaughter Butcher	3	A Deboning & Slaughter Butcher is responsible for slaughtering beef, sheep, goat, fish, pork, and poultry by boning or deboning meat under supervision to meet the given targets and ensure compliance with the applicable standards.	**A Deboning & Slaughter Butcher must be able to:** • Bone or debone meat as per the given instructions. • Use the relevant tools and equipment ensuring personal safety. • Follow the applicable food hygiene and safety standards. **A Deboning & Slaughter Butcher must know and understand:** • How to bone or debone different types of meat using the relevant tools and equipment.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
			• Applicable food hygiene and safety standards.				
Slaughteri ng Line Operator	3	A Slaughtering Line Operator is responsible for operating the slaughtering line that includes of supply of live stocks, scalding, dehairing and washing and other processing. The individual is also responsible for maintaining hygiene and safety in the storage area as per the supervisor's instructions.	**A Slaughtering Line Operator must be able to:** • Load the animals in slaughter line and responsible for initial processing and scalding, dehairing, washing, etc. • Perform general maintenance of the equipment. **A Slaughtering Line Operator must know and understand:** • Different type of equipment used in meat & poultry • Process of operating various machineries • How to perform general maintenance • Applicable health and safety standards	✓	✓	✓	
Meat Mincer Operator	4	A Meat Mincer Operator is responsible for fine chopping and/or mixing of raw or cooked meat. The person is also responsible general maintenance, cleaning of the mincer.	**A Meat Mincer Operator must be able to:** • Chop the meat using Mincer. • Perform general maintenance of the equipment **A Meat Mincer Operator must know and understand:** • Process of operating various machineries • How to perform general maintenance • Applicable health and safety standards		✓	✓	✓
Thermofor ming, Traysealin g,	4	A Thermoforming, Traysealing, Horizontal Flow	**A Thermoforming, Traysealing, Horizontal Flow Pack, Vertical Flow Pack and Stretch Film**			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
Horizontal Flow Pack, Vertical Flow Pack and Stretch Film Machine Operator		Pack, Vertical Flow Pack and Stretch Film Machine Operator is responsible for preparing and operating the packaging machine to pack meat and poultry. The individual is also responsible for performing general maintenance of the packaging machine and maintain the record of packing operations.	**Machine Operator must be able to:** • Select the packaging material and method according to the type of meat to be packed • Prepare and operate the packaging machines to pack the meat and poultry products • Label the packaged food products with the required information • Carry out general maintenance of the packaging equipment **A Thermoforming, Traysealing, Horizontal Flow Pack, Vertical Flow Pack and Stretch Film Machine Operator must know and understand:** • Different types of material used for packaging the meat and poultry products • Various methods of packaging the meat and poultry products				
Meat & Poultry Processing Unit Supervisor	5	A supervisor is responsible for supervising and coordinating the activities of meat & poultry processing plant workers. The individual is also responsible for monitoring and ensuring effective functioning of various equipment in the plant.	**A Supervisor must be able to:** • Arrange the required resources for the smooth operation of the processing plant • Manage the inventory and review the accounting records • Train and supervise a team of plant workers • Inspect the plant equipment and systems regularly for correct functioning	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
			A Supervisor must know and understand: • Inventory management and applicable accounting practices • How to train and manage a team of workers • Various tools, equipment and machineries used in a processing plant, common issues encountered with them and their basic troubleshooting				
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards.			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
			• Record research or operational data				
Veterinarian	6	A Veterinarian is responsible for conducting examinations on livestock, observing flock behaviour, carrying out vaccinations, evaluating meat and making nutritional recommendations.	**A Veterinarian must be able to:** Examine livestock to detect any disease or injuries. • Prescribe appropriate treatment according to the disease identified. • Suggest feed change to for optimum production. **A Veterinarian must know and understand:** • Signs of disease and stress in livestock. Various diseases found in livestock and their appropriate treatment.			✓	✓
Storage Manager	6	A Storage Manager is responsible for ensuring appropriate storage of all types of meat and poultry products.	**A Storage Manager must be able to:** • Arrange for the storage of different types of meat and poultry products. • Store meat and poultry products under hygienic conditions and the recommended temperature. **A Storage Manager must know and understand:** • Appropriate temperature required for storing a variety of meat and poultry products. • Appropriate handling of meat and poultry products.	✓	✓	✓	✓
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Mediu m	Large
		plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	• Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.				

Table 84: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

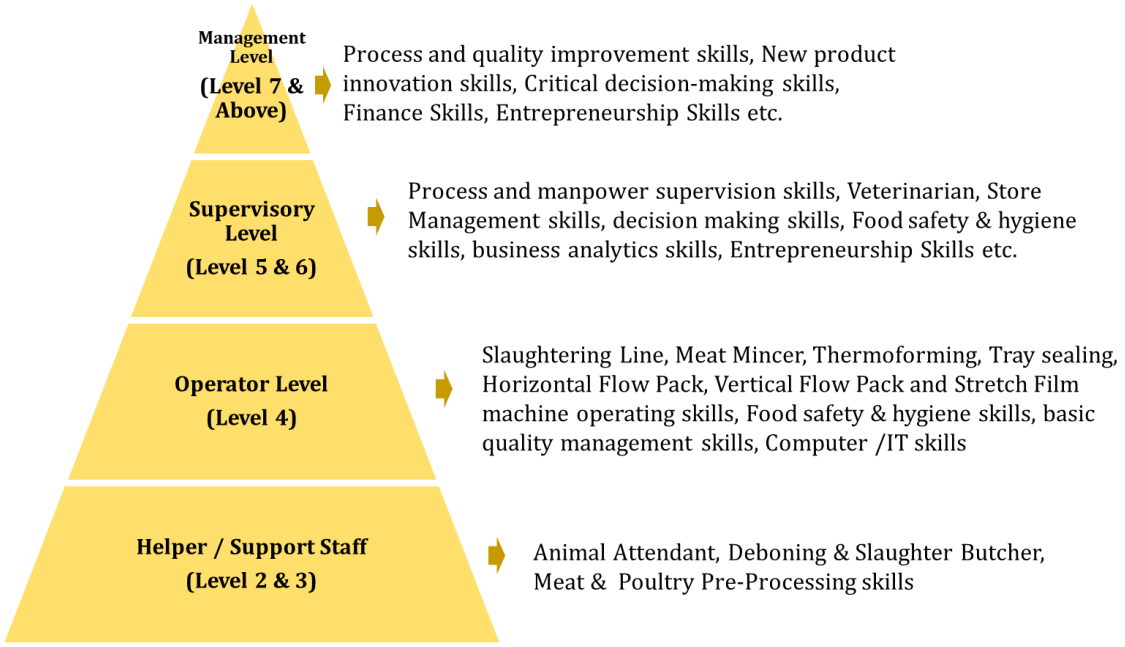


Figure 95: Skill Sets required across multiple levels in the sector

10.8 Expectations from the Industry stakeholders

Modernization of municipal slaughter house would require trained manpower for respective operations. Certified capacity building programme should be introduced for veterinarians, meat inspectors, butchers, etc. Training programmes could be conducted on various topics such as

- Butcher personal hygiene and care
- Meat inspection
- Meat stall management and environmental sanitation
- Care and maintenance of butcher tools
- Equipment hygiene

It is expected to introduce new, Under Graduate programs in meat processing technology. The sector is likely to open up huge employment opportunities with more modernization of slaughter houses and processing units. Introduction of automation is key factor for the development of this sector

As of now, Women employees have a limited role in the Buffalo meat processing. It is important that needs to be taken to improve the role of women in this industry.

Industry to work towards introduction of value added products in both Meat and poultry related products. New products demand for investments and higher employment.

It is expected that focus should be on a skill development programs on the basis of different set of roles. This can help industries help absorb people directly to get on the job without putting employees through any prior training programs

Chapter 11: Sub-Sectoral Analysis – Milling

11.1 Market summary

India is the world's second largest producer of fine cereals, rice and wheat, and by far the largest producer of pulses. This has also helped grow the Milling industry in India, as these cereals and pulses need to be milled for human consumption. India processes approximately 200 million tons of various grains and the industry employs roughly 480,000 persons. Indian grain milling industry has a mix of both traditional and modern equipment being used. The industry is highly fragmented. There are a very large number of small mills and medium-sized milling units spread across the country. For wheat milling, 60- 65% of the wheat that produced in the country is converted to 'atta' produced primarily by the unorganised players (Chakkis) and the organised roller flour mills. Rice milling is one of the most prevalent businesses in the country, triggered by growing production, expanding domestic consumption and increasing export. India is the world's largest rice exporter with annual shipments of about 10 million tons consisting of Basmati and non-Basmati rice varieties. Mills with huller and sheller for rice milling is highly unorganized. These mills convert paddy into rice and the yield is approximately 63-68 percent depending on various parameters. The next big milling activity in India is pulse milling (Dal mills). Modern dal mills with capacities of 200-500 tons have come up in India recently to take advantage of growing demand for the grain, especially packaged and branded pulses. The overall production of oil seeds in the country 34.19 MMT (2019 – 20), and this is processed in mills which are categorised as Ghani's, Solvent Extractors and Oil refineries. Ghanis are largely unorganised, while the solvent extractors and oil refineries are more organised in nature. There are multiple reasons for limited growth of Milling industry are population growth, growing at approx. 1% CAGR since 2015, though the industry is witnessing some structural changes and evolutions which are likely to continue in the coming years. Factors like consumers moving towards good quality branded products, Introduction of various kind of health-benefit products, attractive packaging, Increasing number of QSR outlets, Cafes, eateries and fast food restaurants, society's shift towards high quality processed oil are going to propel growth at a steady pace and the trend is likely to continue in the coming years.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	21,795
No. of registered units	23,792
Past Growth rate (CAGR) (FY' 15 – FY' 20)	2.1%
Total Number of Employees (FY' 20)	4,82,418 nos.
Overall Exports (FY'20)	INR 2,369 Crs.
Expected Market ('000 MT) FY' 2030	28,050
Future growth rate (FY' 20 – FY' 30)	2.6%
Total Employee Estimation (FY' 30)	6,05,753 nos.
Overall Employment Additions (FY' 20 – FY' 30)	1,23,335 nos.

Table 85: Milling: Key Industry Indicators

11.2 Present State of the Industry & Future Outlook

Milling - Grains (Flour, Pulses, Rice) and Oilseeds

India is the world's second largest producer of fine cereals, rice and wheat, and by far the largest producer of pulses. This has also helped grow the Milling industry in India, as these cereals and pulses need to be milled for human consumption.

India processes approximately 200 million tons of various grains and the industry employs roughly 370,000 persons. Indian grain milling industry has a mix of both traditional and modern equipment being used. The industry is highly fragmented. There are a very large number of small mills and medium-sized milling units spread across the country.

For wheat milling, 60- 65% of the wheat that produced in the country is converted to 'atta' produced primarily by the unorganised players (Chakkis) and the organised roller flour mills. There are roughly 900 large stone mills that account for about 15 percent of flour production. These mills produce wheat flour (atta), finely milled white flour (Maida) and kind of semolina (sooji or rawa)[38].

Rice milling is one of the most prevalent businesses in the country, triggered by growing production, expanding domestic consumption and increasing export. India is the world's largest rice exporter with annual shipments of about 10 million tons consisting of Basmati and non-Basmati rice varieties.

Mills with huller and sheller for rice milling is highly unorganized. These mills convert paddy into rice and the yield is approximately 63-68 percent depending on various parameters.

The next big milling activity in India is pulse milling (Dal mills). There are approximately 7,000 operating dal mills in India, most of which have rather small capacities of 10-25 tons a day.

Modern dal mills with capacities of 200-500 tons have come up in India recently to take advantage of growing demand for the grain, especially packaged and branded pulses. In addition to pulse splitting, many of the mills produce chickpea flour (known as Besan) for which there is tremendous demand across the country as it is used in many traditional food products including snacks.

Foreign direct investment (FDI) in milling industry is permitted 100 percent under the automatic route. Many investors are exploring opportunities in India given its large size of the domestic market and opportunities of export to Asian and African neighbours.

India is the 4th largest[39] oil seed producing economy in the world after USA, China and Brazil, which contributes about 10% of the world oilseeds production. Although India has 20.8% of the world's area under oilseed crops, it accounts for about 10% of global production. This is because of low productivity of oilseed crops and year to year fluctuations in production in India.

Nine oilseeds are the primary source of vegetable oils in the country, which are largely grown under rainfed condition over an area of about 26 million ha[40].

[38] Millermagazine – Article by G. Chandrashekhar, Economist, Senior Editor and Policy Commentator, is a global agribusiness and commodities market specialist
[39] Indian Chamber of Food & Agriculture
[40] Indian Chamber of Food & Agriculture

Among these, soybean (34%), groundnut (27%), rapeseed & mustard (27%) contributes to more than 88% of total oilseeds production and >80% of vegetable oil with major share of mustard (35%), soybean (23%) and groundnut (25%). India is producing about 7-8 million tons of vegetable oils from primary sources[41].

In addition to nine oilseeds, 3 million tonnes of vegetable oil are being harnessed from secondary sources like cottonseed, rice bran, coconut, Tree Borne Oilseeds (TBOs) and Oil Palm. Oil palm which is categorized as secondary sources of oils should be included as primary source as it gives the highest per ha oil yield (4-5t/ha) [42].

Manufacturing Clusters:

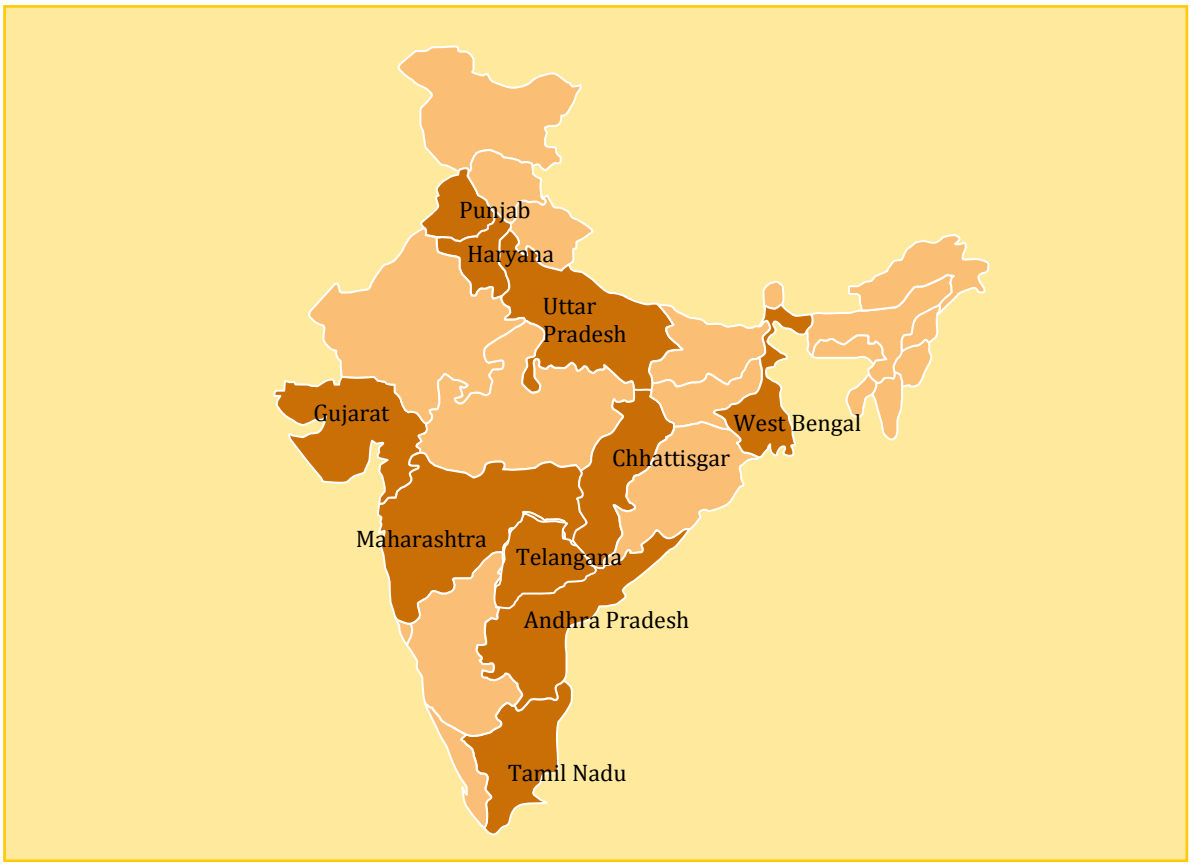
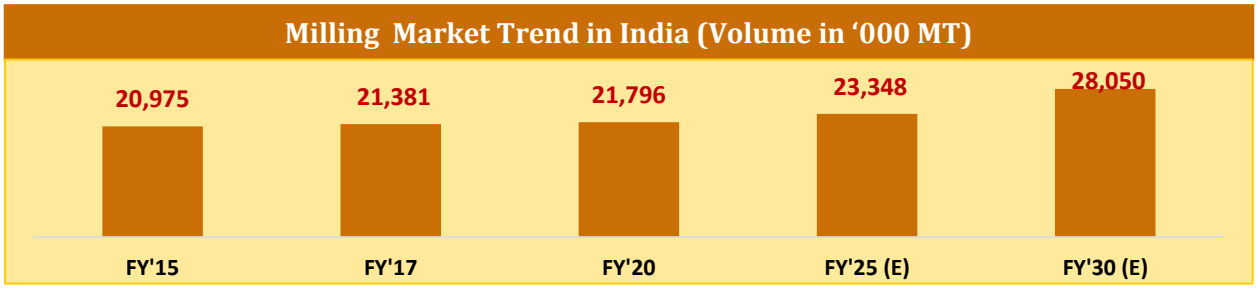


Figure 96: *Manufacturing Clusters: Milling Industry*

Top 10 states account to 79% of total employment in the Milling industry

Market Overview



[41] Indian Chamber of Food & Agriculture
[42] SOPA, Indian Chamber of Food & Agriculture

Figure 97: Overall Milling Market Trend in India

Source: Feedback Analysis

11.3 Present Employment Scenario & Analysis

Category of the Companies by Revenue

The milling industry is generally classified based on capacity. However, for uniformity, the industry has been classified based on the revenue guidelines of RBI. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

11.3.1 Sample Coverage by Categories of Companies & Region

Category of the Company	Sample Coverage (N)	East	North	West	South
Micro Enterprises	300	18%	22%	24%	36%
Small Enterprises	214	19%	12%	39%	30%
Medium Enterprises	97	27%	9%	42%	22%
Large Enterprises	10	20%	40%	20%	20%
Total	**621**	**20%**	**17%**	**32%**	**31%**

Table 86: Sample Coverage by Categories of Companies & Region

11.3.2 Total No. of Employees

Past Trend of employment in the Milling Sector

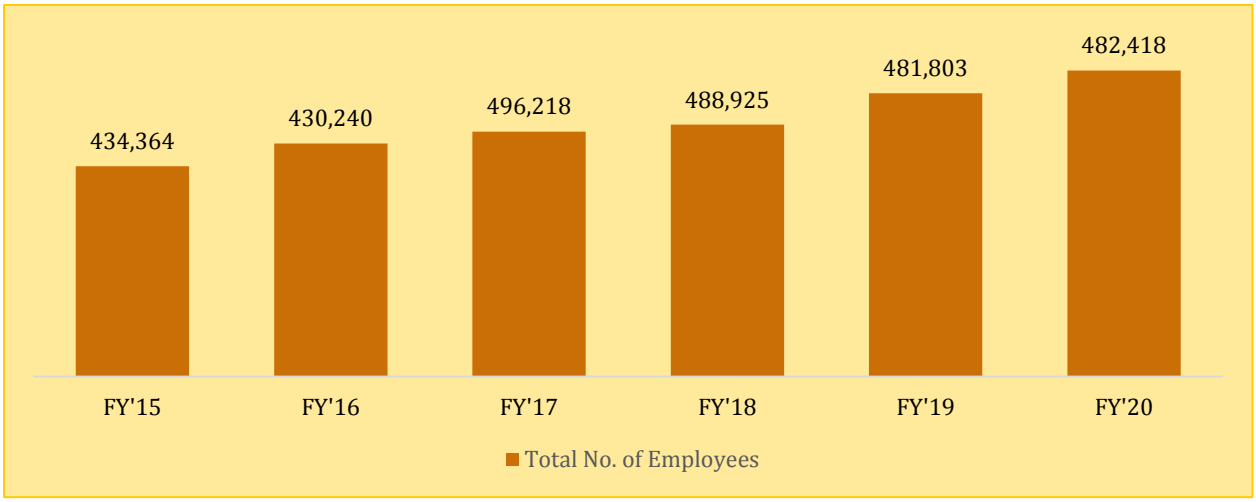


Figure 98: Past Trend of employment in the Milling Sector

Source: Feedback Analysis

Share of Employees (FY' 20) Break by Different Category

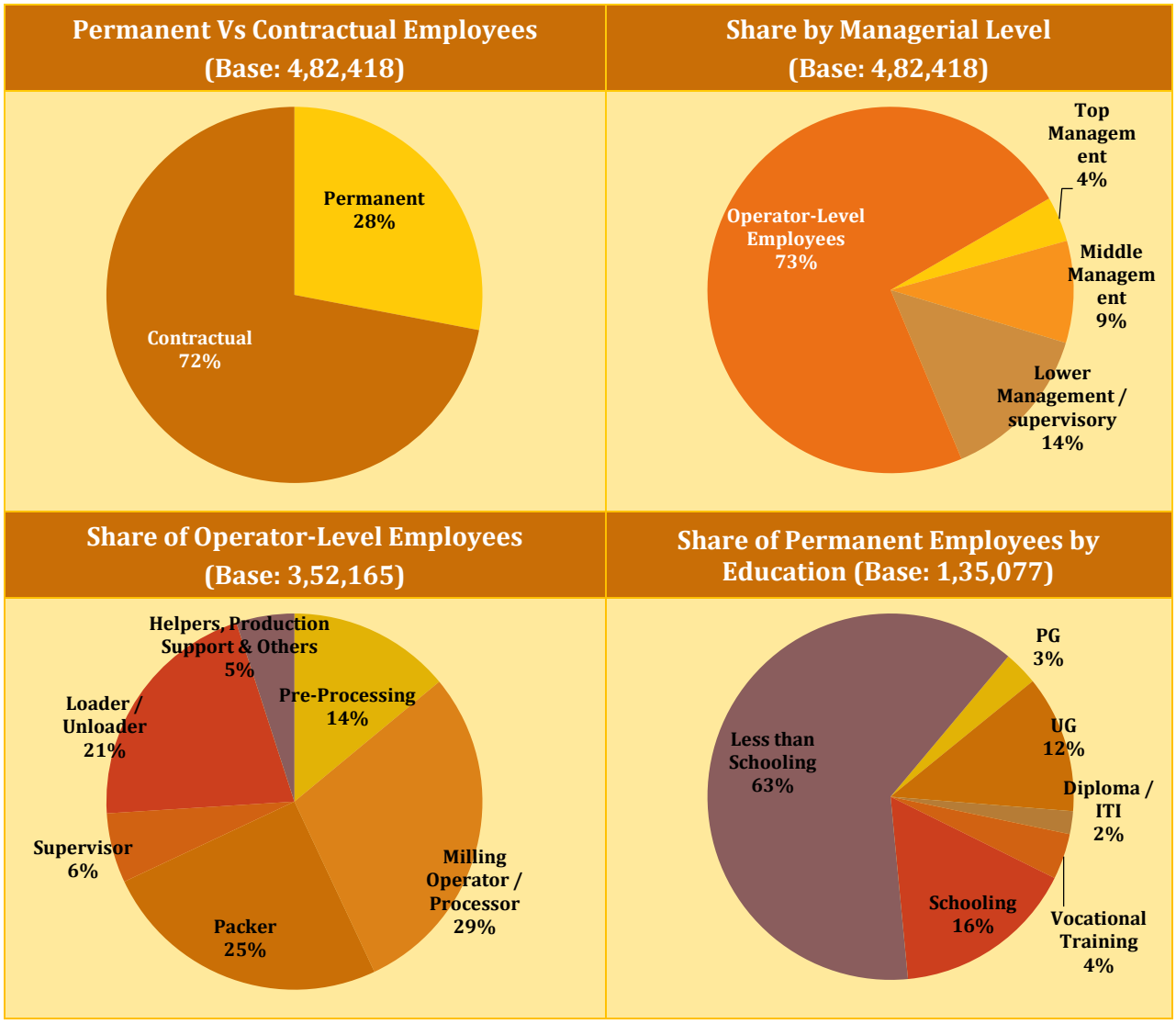


Figure 99: *Share of Employees (FY' 20): By Different Category*

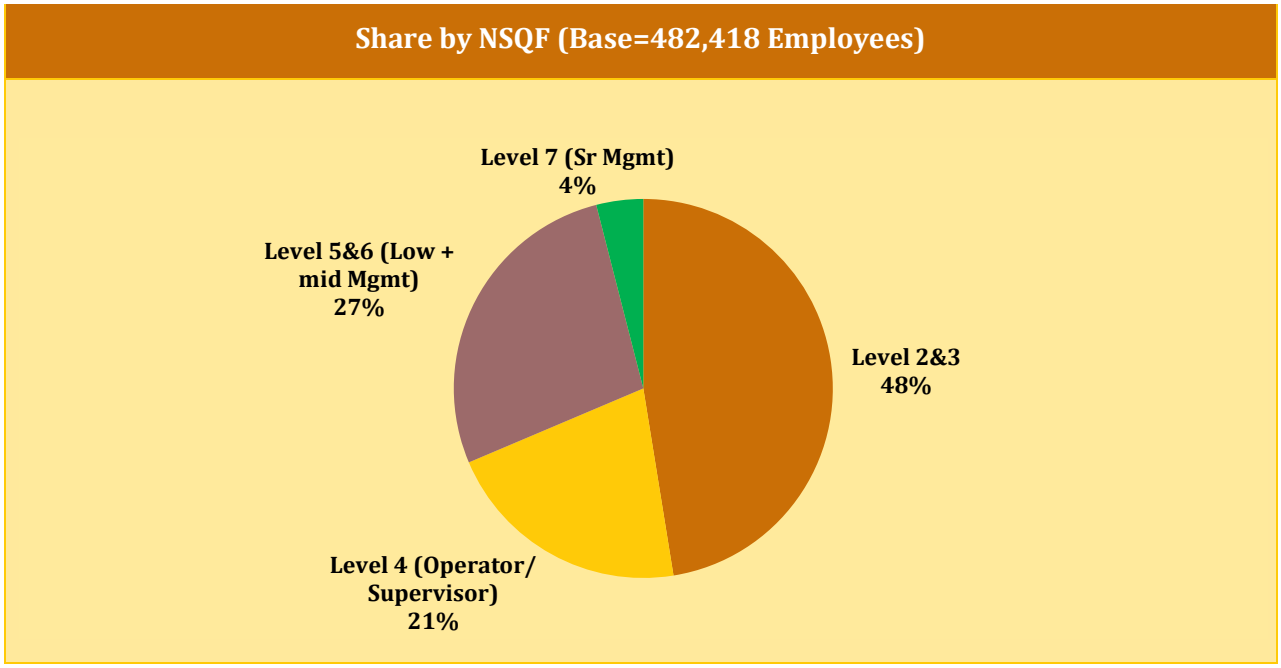


Figure 100: *Share of Employees (FY'20) : By NSQF levels*

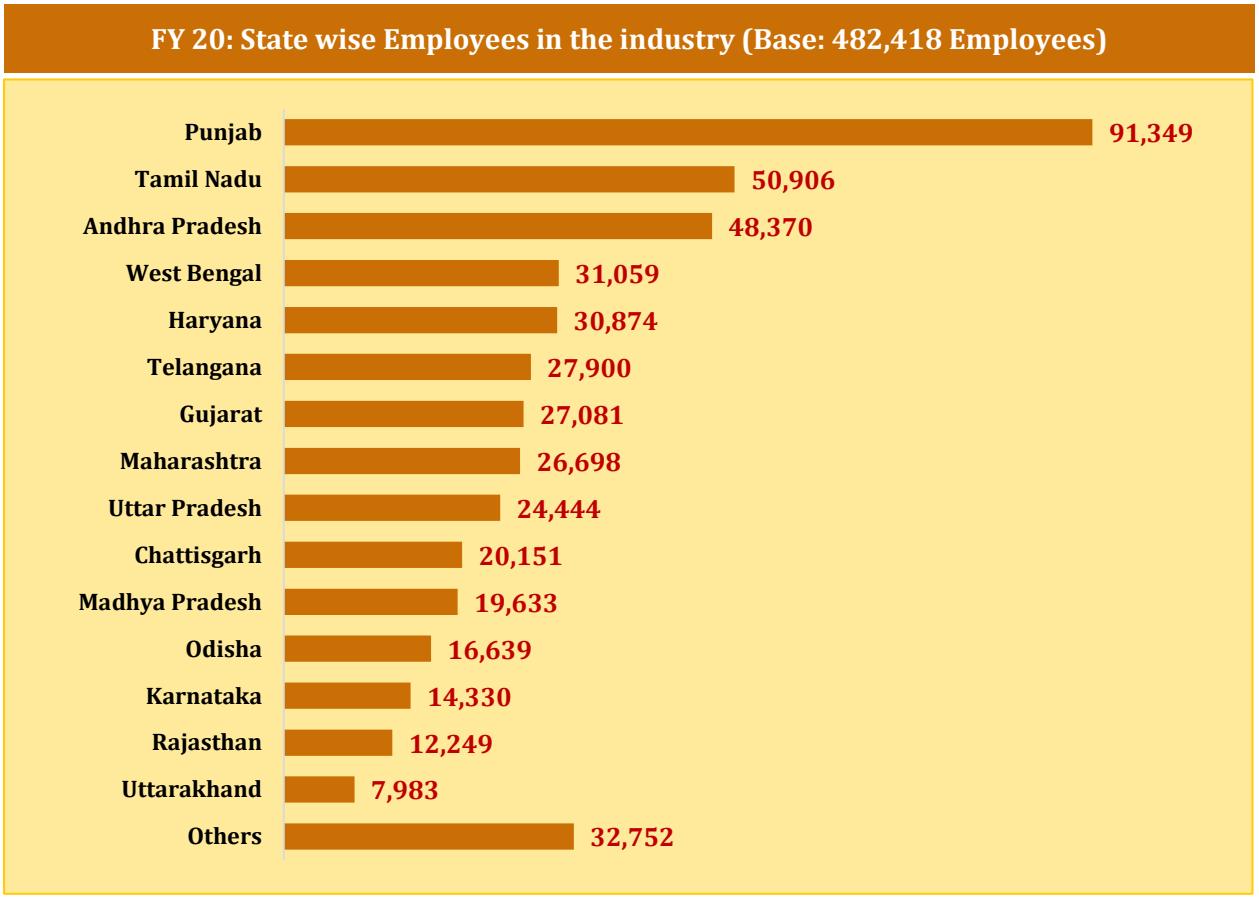


Figure 101: *State wise Employees in the Industry (FY'20)*

Source: Feedback Analysis

Top 15 states account to 93% of total employment in the industry

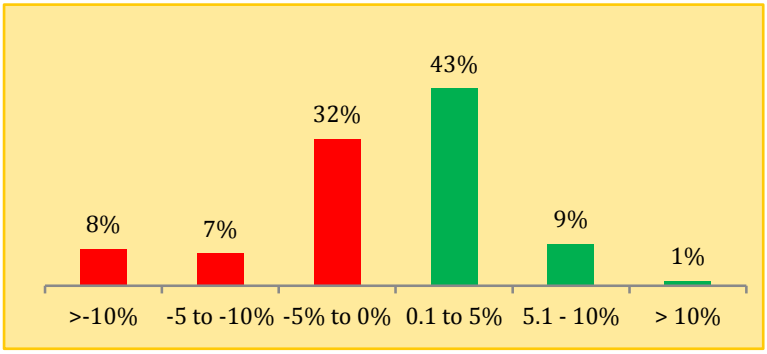
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Pre-Processing Labours	Cleaning & grading the grains or oilseeds. Process includes winnowing; grading and manual drying. Grains / Oilseeds are cleaned to remove the plant residue, soil, stones, etc. Large companies have vertical dryer and horizontal rotary dryer for the purpose of drying which are used by pre-processing labours.	3	✓	✓	✓	
2	Pulses Mill Operator	A Pulses Mill Operator is responsible for preparing the mill for use and operating it to carry out various processes for the milling of different types of pulses, such as de-husking, cleaning, polishing and grading	4	✓	✓	✓	✓
3	Rice Mill Operator	A Rice Mill Operator is responsible for preparing the rice mill for use and carrying out various processes such as pre-cleaning, dehulling/ de-husking, paddy separation, whitening/ polishing, separation of white rice, rise mixing, mist polishing, weighing, and packing.	4	✓	✓	✓	✓
4	Oilseed Mill Operator	An Oilseed Mill Operator is responsible for carrying out various processes in an oilseed mill such as pre-cleaning, cleaning, decortication, crushing/ grinding/ flaking, conditioning, oil extraction, oil clarification, etc.	4	✓	✓	✓	✓
5	Gram Flour Mill Operator	A Gram Flour Mill Operator is responsible for carrying out various processes in for milling gram, such as cleaning, conditioning, breaking, scalping, purification,	4	✓	✓	✓	✓

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
		reduction, dressing, finishing and packing. The individual uses a variety of machineries and equipment for the purpose, such as milling separator, aspirator, dust collector, double roller mill, sifter, etc.					
6	Production Specialist	Production Specialist acts as extension of milling technician where the job responsibilities include of removal of cloudiness & excess color from oil, filtering, etc.	4			✓	✓
7	Machine Operator (Packing Machinery)	Operating machine and also for maintenance of machines for packing	4		✓	✓	✓
8	Shift Supervisor	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
9	Helpers	Misc. work including cleaning plants, Machinery after every batch, etc.	3	✓	✓	✓	
10	Loader / Unloader	Material handling, Loading & Unloading products.	3	✓	✓	✓	✓
11	Accountant / Invoicing Clerk	Managing accounting and day to day transaction entry in the ledger	3	✓	✓	✓	
12	Sales and Distribution Support	Sales Executives / Distribution to the Channel Partners	3			✓	✓

Table 87: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

11.3.3 Past Growth of Employees (FY'17 – FY'20)



- >45% of the enterprises have experienced degrowth in their manpower in the past 3 years.
- 43% have indicated that their manpower has grown marginally (up to 5%).

Figure 102: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

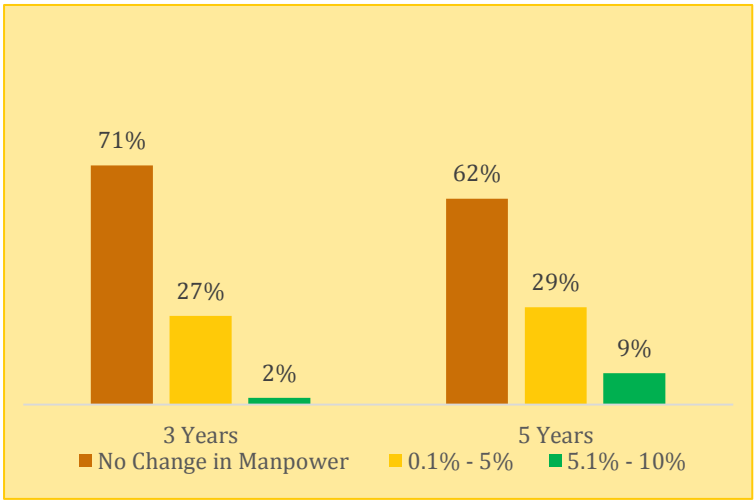
11.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Planning to invest in Internet of Things (IoT) or Automation	12%	9%	36%	20%
Plan to invest on new equipment / New Facility	0%	0%	0%	20%
Plan to enhance the production capacity	32%	12%	24%	40%
Plans to launch new products	0%	0%	17%	0%
Plans to increase exports	0%	21%	0%	0%

Table 88: Future Plans of the Companies covered

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- <1% in next 3 years (Average)
- 1% – 2% in next 5 years (Average)

Figure 103: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

Source: Feedback Analysis

11.4 Recruitment & Training Practice

Recruitment Practice

Walk-in is the key source of recruiting candidates across Operational level and Lower-level employees. Following are the key institutes encountered during survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal training institutes offering Food Tech / Food Science programs
Middle Management	• Formal training institutes offering Food Tech / Food Science programs
Lower-Level Management	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 89: Recruitment Practice

Training Practice

Overall, 16% of the companies we have covered as part of the sample are providing training across levels when an employee joins the firm (On-the-Job training).

% of Companies offering training

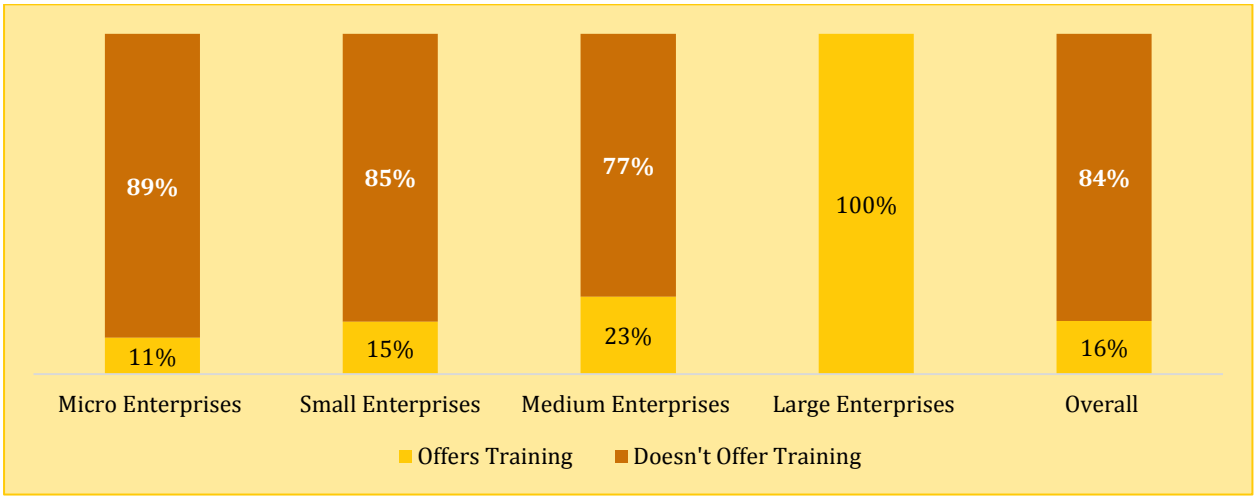


Figure 104: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Processing Operations	Proper cleaning, grading, usage of dryer (machinery) with the wastage of less than 2%	Operator Level Employees	✓	✓	✓	✓

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Milling Techniques	Details of all processes involved. Effective way of filtration of flour, cleaning of Oil, color removal from oil, etc.	Operator Level Employees; Lower-Level Employees; Supervisors / Managers	✓	✓	✓	✓
Supervision of product handling activities	Appropriate packing methods, latest technology, equipment operations, etc.	Supervisors / Managers			✓	✓
Plant Maintenance	Maintenance checklist for equipment (processing and packing)	Operator Level Employees & Lower-Level Employees (Technicians / Machine Operators)				✓
Packing	Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio					✓

Table 90: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely Satisfied and 1 is extremely dissatisfied)

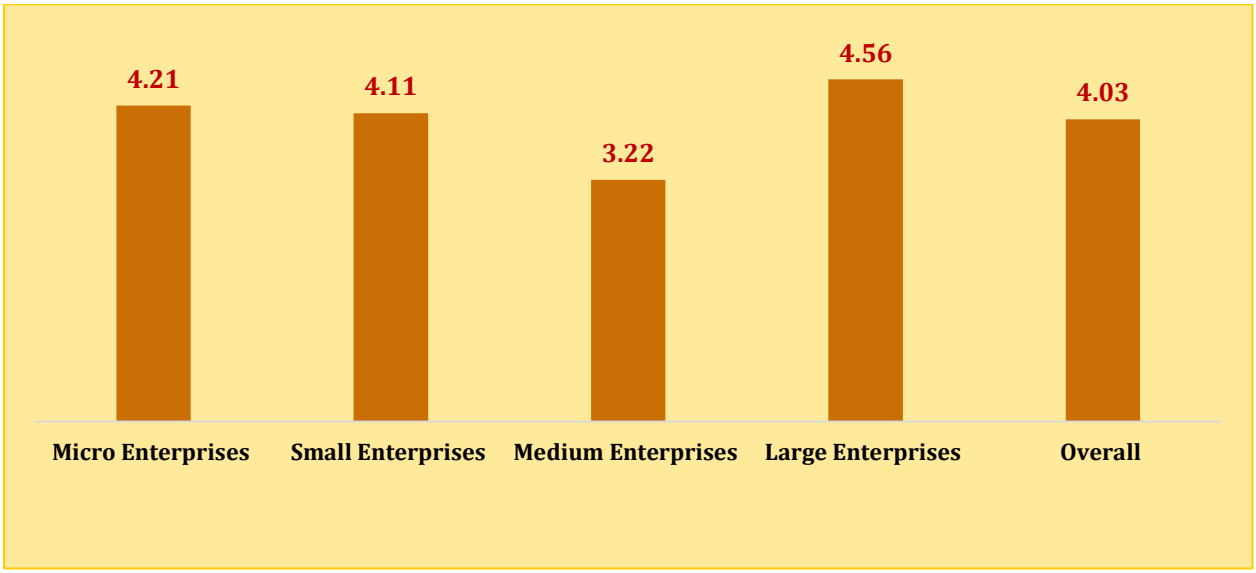


Figure 105: Effectiveness of Training

Source: Feedback Analysis

11.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

- Skilled workers in this industry are very limited. There are no training institutes that offer training on mini milling plant as practical training.
- Among the smaller companies, training is provided by the equipment supplier at the time of purchase of new equipment. With the higher attrition, the regular training becomes a challenge.

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Pre-Processing Labours	Operator Level Employees NSQF: 3	• Skills on grading, sorting, cleaning of seeds • Equipment operations (Dryer) / Manual drying operations	• Lack of knowledge on equipment maintenance and operations (Dryer)	✓	✓	✓	
Milling Technician	Operator Level Employees NSQF: 4	• Technical know-how of all process for milling. • Required output by the products that are milled • Post milling process (Filter / cleaning, etc)	• Unable to maintain the similar output level across batches • Difficulties in operation of new machines even after training from the machinery supplier	✓	✓	✓	✓
Loading / Unloading Labors	Operator Level Employees NSQF: 3	• Materials Handling	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	✓
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygiene awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓	✓	

Table 91: Key job roles and their required skills and skill gaps

11.6 Future Projection – Sector & Employment

Projected growth in Milling industry in India

Based on discussions conducted with the Visionaries and Industry experts, Indian Milling industry likely to grow at a CAGR of 2% - 2.5% CAGR over next 10 years.

Reasons for limited growth of Grain Milling (Rice, Pulses & Dal) industry are as follows:

- Consumption growth of Grain Milling products has very strong correlation with population growth as grains are consumed by almost everyone in the country. India's population is growing at approx. 1% CAGR since 2015. Besides, Indian Grain Milling industry is also stagnated since last 3 years. Considering both the facts, a meagre growth of 1.5% CAGR has been considered for Indian Grain Milling industry.
- However, the industry is witnessing some structural changes and evolutions which are likely to continue in the coming years:
    - Though the industry is highly fragmented, consumers are slowly moving towards good quality branded products and as a result, share of the large and medium enterprises are slowly increasing. Brand consciousness has significantly improved in this industry in the last few years.
    - Introduction of various kind of health-benefit products along with attractive packaging. Some of these products are multi-grain flours, whole wheat flours etc.
    - Share of organized retail is increasing. At present around 8% of packaged Atta is sold through the modern retail channel and as per experts, may reach to 15-20% in next 10 years.
    - Increase in Private label sales across modern retails in India.

On the other hand, Oilseed Milling industry likely to grow at a slightly better rate due to the following factors:

- Increasing number of QSR outlets, Cafes, eateries and fast food restaurants across the country fuelling the demand for edible oils.
- A section of the society is shifting towards low cholesterol edible oils from products like Ghee, Butter etc.
- Export of edible oil is increasing at a steady pace and the trend is likely to continue in the coming years. According to the Solvent Extractors' Association of India (SEA), India exported 80,765 tonnes of various edible oils valued at ₹955.51 crore during 2019-20, against 52,490 tonnes valued at ₹627.11 crore during the previous year 2018-19. Major oils exported are groundnut oil, rice bran oil and also small quantities of sesame oil, sunflower oil and mustard oil.
- Similar to Grain Milling industry, Oilseed milling industry is also undergoing structural changes and evolutions such as emergence of Branded products, introduction of various types of edible oil with higher health benefits, higher sales through organized retail channel etc.

Future Market & Growth Rate of the Milling industry in India

Year	Market Size - Grain Milling ('000 MT)	YoY Growth	Market Size - Oilseed Milling ('000 MT)	YoY Growth	Market Size - Total Milling ('000 MT)
FY'20	15,575		6,220		72,498
FY'21 (E)	15,784	1.3%	6,433	3.4%	73,600
FY'22 (E)	16,388	1.7%	6,660	3.5%	74,943
FY'23 (E)	16,640	1.5%	6,900	3.6%	76,233
FY'24 (E)	16,880	1.4%	7,133	3.4%	77,467
FY'25 (E)	17,160	1.7%	7,380	3.5%	78,880
FY'26 (E)	17,763	1.4%	7,633	3.4%	80,133
FY'27 (E)	18,048	1.6%	7,913	3.7%	81,580
FY'28 (E)	18,293	1.4%	8,187	3.5%	82,853
FY'29 (E)	18,942	1.5%	8,493	3.7%	84,260
FY'30 (E)	19,250	1.6%	8,800	3.6%	1,39,500

Table 92: Future Market & Growth Rate of the Milling industry in India

100% FDI is permitted in the Milling industry under automatic route. Many investors are exploring business opportunities in India considering the sheer size of the domestic market and also due to the export opportunities to Asian and African neighbours.

There is scope for capacity scale-up and modernization of many milling units in the country. Govt. of India is providing financial assistance for modernization of grains and pulses milling with latest technologies.

Select ongoing and upcoming projects of Milling industry in India

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Vikas W S P Ltd.	Sri Ganganagar Gluten Free Flour Project	Ganganagar, Rajasthan	New Unit	196
2	Alcobrew Distilleries India Pvt. Ltd.	Kandla (Solan) Malt Distillation and Saturation Manufacturing Plant Project	Solan, Himachal Pradesh	New Unit	65.39
3	Easternzone Industries Pvt. Ltd.	Flour Mill (Bahuda) Project	Cuttack, Odisha	New Unit	50

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
4	Patel Retail Pvt. Ltd.	Flour Milling (Anjar) Project	Kachchh, Gujarat	New Unit	30
5	B L Agro Oils Ltd.	Flour Mill (Jauharpur) Project	Bareilly, Uttar Pradesh	New Unit	25
6	Maa Mundeshwari Flour Mill Pvt. Ltd.	Flour Mill (Mohania) Project	Bhabhua, Bihar	New Unit	20
7	Anjani Agro Food Products Pvt. Ltd.	Wheat Flour (Vemgal) Project	Kolar, Karnataka	New Unit	16
8	L T Foods Ltd.	Punjab Non-Basmati Plant (Phase 2) Project	Punjab	New Unit	12
9	Kewlani Agro Industries Pvt. Ltd.	Flour (Madhav Nagar) Project	Katni, Madhya Pradesh	New Unit	10
10	Aditya Flour Mills Pvt. Ltd.	Bokaro Flour Mill (Suji, Besan) Project	Bokaro, Jharkhand	New Unit	1
11	Punjab State Co-op. Supply & Marketing Fedn. Ltd.	Flour Mill (Punjab) Project	Punjab	New Unit	NA
12	Baba Gorakhnath Flour Mills Ltd.	Flour Mill (Akbarpur) Project	Kanpur, Uttar Pradesh	New Unit	NA

Table 93: Select ongoing and upcoming projects of Milling industry in India

Source: CMIE & Projects Today

FY'20 employment estimation in Indian Grain Milling industry

Company Category	Average no. of Employees	FY'20 Total No. of Employees in Flour Milling industry	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	450	11,250	10%	1,558	138
Medium Enterprises	80	40,000	20%	3,115	78
Small Enterprises	25	125,000	45%	7,009	56
Micro Enterprises	13	195,858	25%	3,894	20
Total		**372,108**		**15,575**	**42**

Table 94: FY'20 employment estimation in Indian Grain Milling industry

** Based on discussion with the milling units and SMEs*

Note: The milling industry is generally classified based on capacity. However, for uniformity, the industry has been classified based on the revenue guidelines of RBI. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection Grain Milling Industry in India

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	10%	1,925	144	13,369	2,119
Medium Enterprises	20%	3,850	81	47,536	7,536
Small Enterprises	45%	8,663	57	151,462	26,462
Micro Enterprises	25%	4,813	20	237,320	41,462
Total		**19,250**		**449,687**	**77,579**

Table 95: Future employment projection Grain Milling Industry in India

** As per discussion with the grains milling units and SMEs, share of large and medium enterprises are likely to increase marginally over next 10 years' time. The same has been considered in future employment on potential calculation*

 # Based on discussions with equipment manufacturers and SMEs, across all categories of companies will have adoption of automation / industry 4.0 in the coming years. As per equipment manufacturers, this may lead to around 4% improve in the productivity for large and medium enterprises and average 2% improvement in the productivity for the medium and small enterprises. The same has been considered for calculating future employment generation potential.

FY'20 employment estimation Oilseed Milling industry in India

Company Category	Average no. of Employees	FY'20 Total No. of Employees in Oilseed Milling industry	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	350	7,000	10%	622	89
Medium Enterprises	115	34,500	35%	2,177	63
Small Enterprises	50	50,000	45%	2,799	56
Micro Enterprises	10	18,810	10%	622	33
Total		**110,310**		**6,220**	**56**

Table 96: FY'20 employment estimation Oilseed Milling industry in India

** Based on discussion with the milling units and SMEs*

Note: The milling industry is generally classified based on capacity. However, for uniformity, the industry has been classified based on the revenue guidelines of RBI. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection Oilseed Milling industry in India

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	10%	880	89	9,903	2,903
Medium Enterprises	35%	3,080	63	48,809	14,309
Small Enterprises	45%	3,960	56	70,737	20,737
Micro Enterprises	10%	880	33	26,611	7,801
Total		**8,800**		**156,061**	**45,751**

Table 97: Future employment projection Oilseed Milling industry in India

** As per discussion with the grains milling units and SMEs, share of large and medium enterprises are likely to increase marginally over next 10 years' time. The same has been considered in future employment on potential calculation*

 # Based on discussions with equipment manufacturers and SMEs, there could be marginal adoption of automation / industry 4.0 in the coming years. However, that will have negligible impact on the productivity of the employees. Hence, the same productivity values have been considered for future employment generation potential.

Future combined employment projection in the Grains and Oilseed Milling industry

	FY 20 Production ('000 MT)	FY 20 Employment	FY'20 Annual Production/ Employee (MT)	FY 30 Production ('000 MT)	FY 30 Employment	FY'30 Annual Production/ Employee (MT)	FY'20-FY'30 Employment Addition
Grain Milling	15,575	372,108	42	19,250	449,687	43	77,579
Oilseed Milling	6,220	110,310	56	8,800	156,061	56	45,751
Total	**21,796**	**482,418**	**45**	**28,050**	**605,748**	**46**	**123,330**

Table 98: Future combined employment projection in the Grains and Oilseed Milling industry

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category

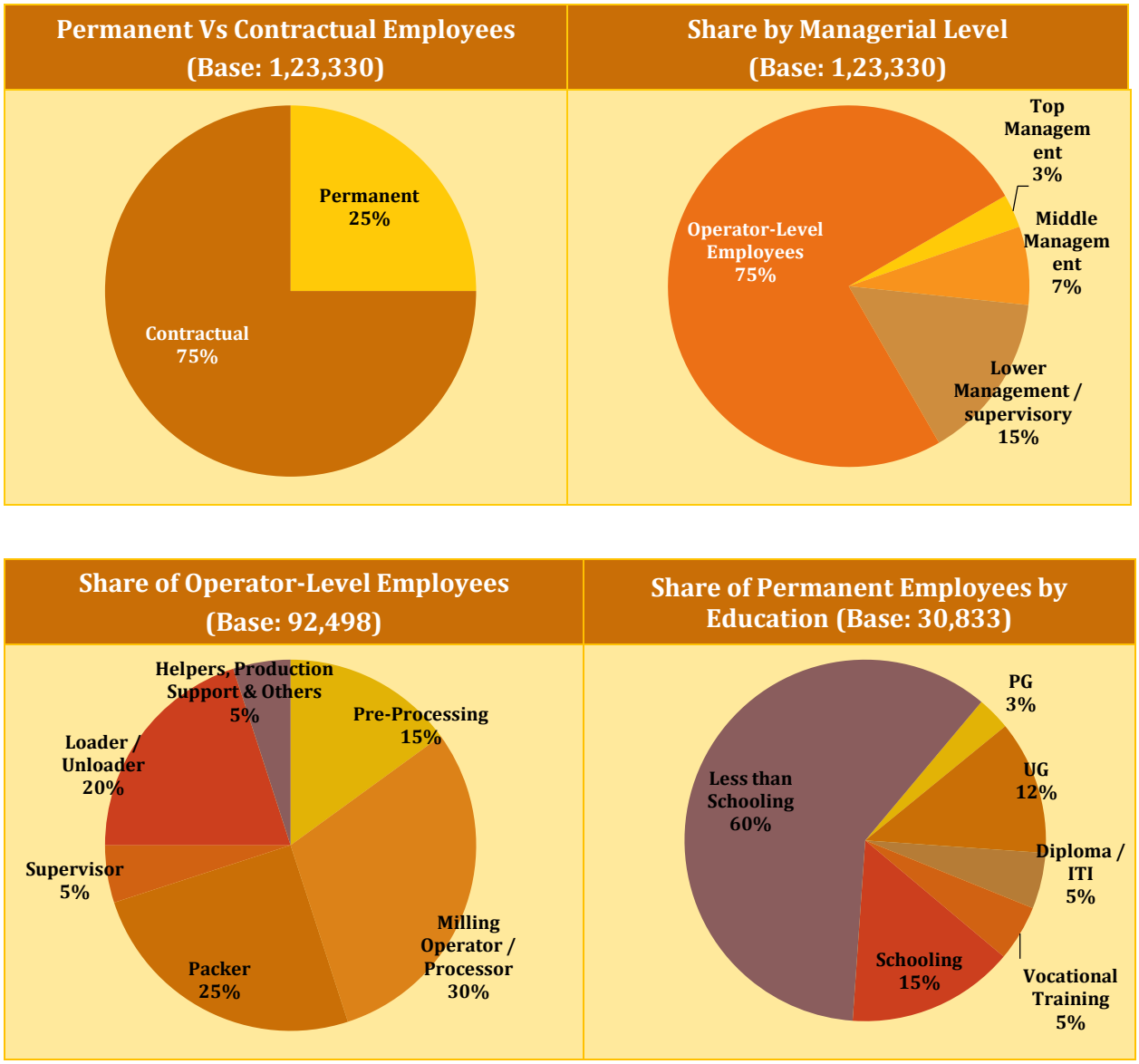


Figure 106: Share of FY'20 - FY'30 Employment Generation potential: By Different Category

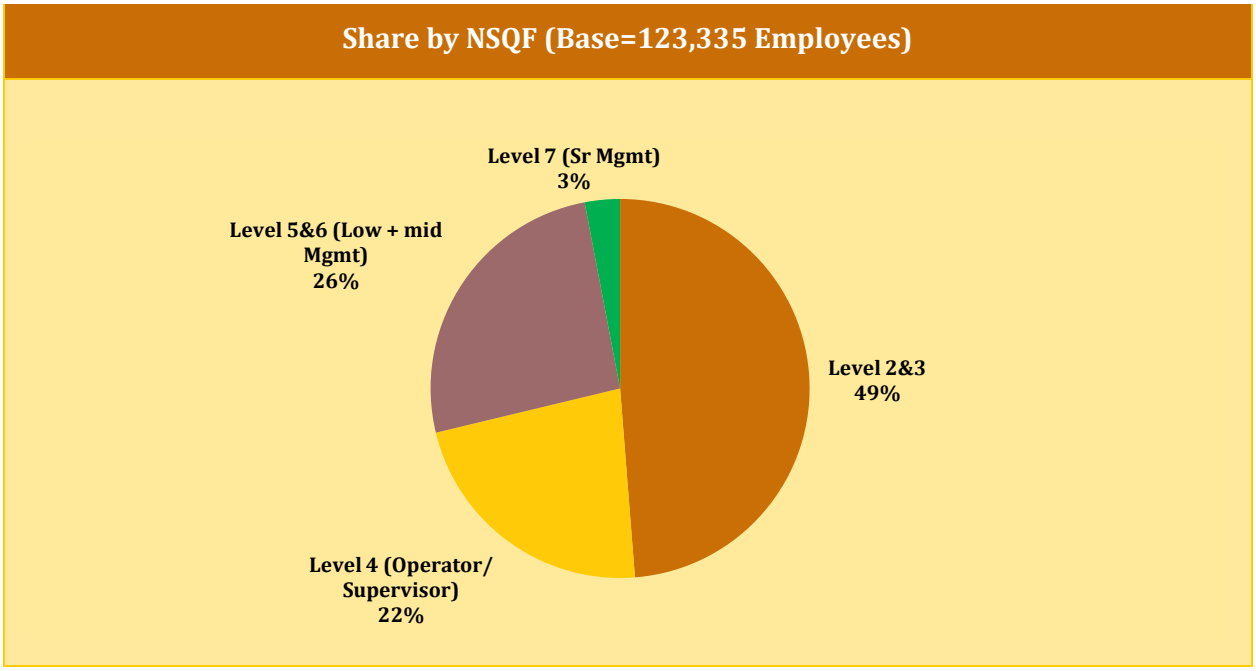


Figure 107: Share of FY'20 - FY'30 Employment Generation potential: By NSQF levels

Source: Feedback Analysis

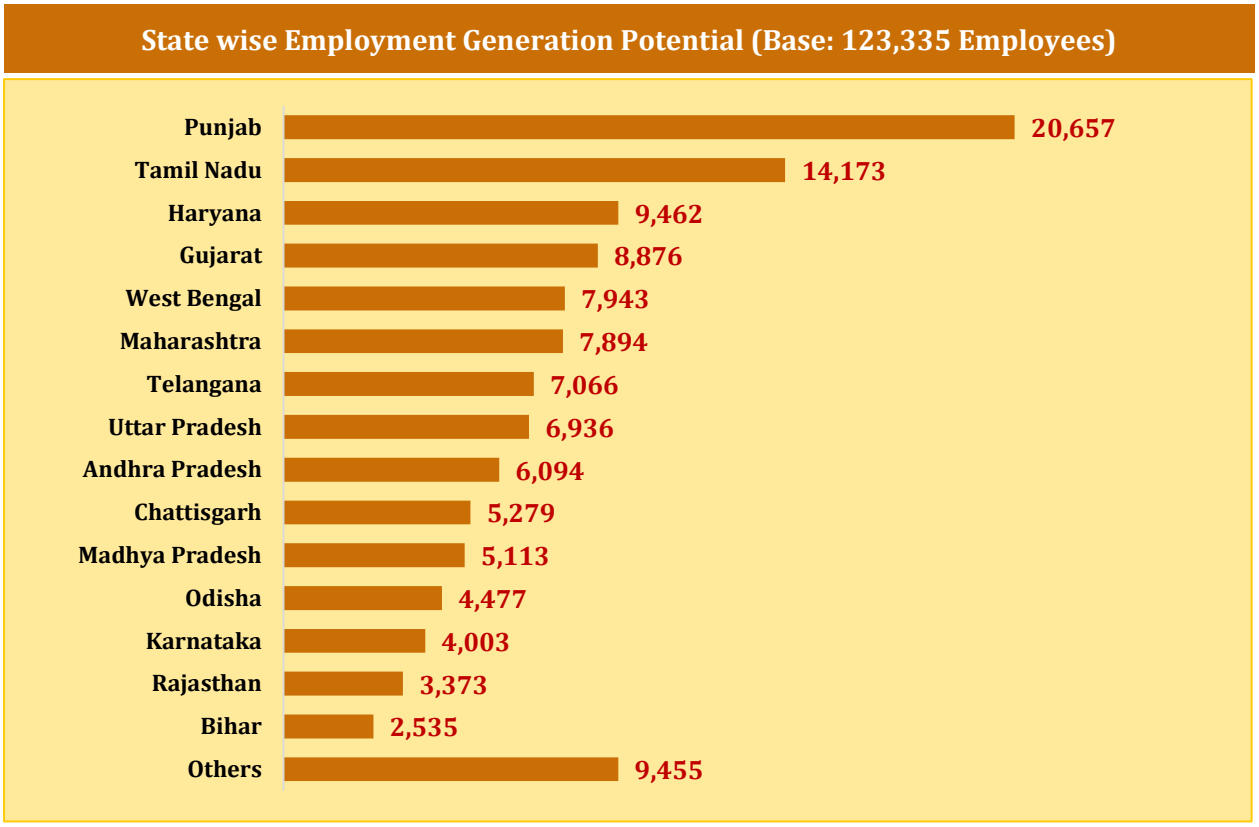


Figure 108: State wise Employment Generation Potential

Source: Feedback Analysis

Top 15 states account to 92% of total employment in the industry

11.7 Existing & Emerging Prominent Job Roles Which Requires Skilling

Milling is one of the key sub-sectors which is highly unorganized and tremendous scope for new employment generation through the efforts of NSDC / FICSI where there are specific programs are to be created. Following are the specific existing and emerging prominent job roles that will create employment opportunities in Milling products Sub-sector in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.	✓	✓	✓	
Grain & Oilseed Cleaner & Pre-processor	3	A Grain & Oilseed Cleaner & Pre-processor Labourer is responsible for cleaning and grading various food items such as grains, oil seeds, etc. The individual also performs other pre-processing activities under supervision.	**A Grain & Oilseed Cleaner & Pre-processor must be able to:** • Clean and grade food items ensuring minimum wastage • Carry out pre-processing operations and	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			operate food dryer machine **A Grain & Oilseed Cleaner & Pre-processor must know and understand:** • Process of cleaning and drying various food items such as grains, oil seeds, etc. • How to operate food dryer machine • Applicable food hygiene and safety standards				
Milling Machine Operator	4	A Milling Machine Operator is responsible for preparing and operating milling machine to mill different types of grains such as rice, wheat, pulses, etc. The individual also carries out general maintenance of the milling machine.	**A Milling Machine Operator must be able to:** • Prepare the milling machine for operation Operate milling machine to mill different types of grains • Carry out general maintenance of the milling machine **A Milling Machine Operator must know and understand:** • How to operate and maintain a milling machine • Applicable food hygiene and safety standards	✓	✓	✓	✓
Wheat Flour Mill Operator	4	A Wheat Flour Mill Operator is responsible for preparing the wheat flour mill for use; cleaning the wheat grains; tempering the grains; grinding the tempered grains in roller mills; sifting the	**A Wheat Flour Mill Operator must be able to:** • Prepare the wheat flour mill for use • Carry out various wheat flour milling processes such as				

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		ground grains into various sizes; and packing the ground wheat products in appropriate packing material. The individual is also responsible for carrying out regular repair and maintenance of the wheat flour mill.	cleaning, tempering, grinding, sifting, etc. • Pack the wheat flour mill products • Carry out regular repair and maintenance of wheat flour mill • Follow the applicable food hygiene, and health and safety standards **A Wheat Flour Mill Operator must know and understand:** • Applicable food hygiene, and health and safety standards • How to prepare and use a wheat flour mill • Various processes carried out during wheat flour milling • How to carry out regular repair and maintenance of wheat flour mill				
Pulses Mill Operator	4	A Pulses Mill Operator is responsible for preparing the mill for use and operating it to carry out various processes for the milling of different types of pulses, such as de-husking, cleaning, polishing, and grading. The individual is also responsible for packing the milled pulses and carrying out regular repair and maintenance of the pulses mill.	**A Pulses Mill Operator must be able to:** • Prepare the pulses mill and relevant equipment for use • Carry out various pulses milling processes such as de-husking, cleaning, polishing, and grading, etc. • Pack the processed pulses mill in appropriate packing material				

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Carry out regular repair and maintenance of pulses mill and relevant equipment • Follow the applicable food hygiene, and health and safety standards **A Pulses Mill Operator must know and understand:** • How to prepare and use a pulses mill • Various processes carried out during the milling of pulses • How to carry out regular repair and maintenance of pulses mill and relevant equipment • Applicable food hygiene, and health and safety standards				
Rice Mill Operator	4	A Rice Mill Operator is responsible for preparing the rice mill for use and carrying out various processes such as pre-cleaning, dehulling/ de-husking, paddy separation, whitening/ polishing, separation of white rice, rice mixing, mist polishing, weighing, and packing. The individual is also responsible for carrying out minor repair and maintenance of the rice mill.	**A Rice Mill Operator must be able to:** • Set up the rice mill for the milling operation • Carry out various processes during rice milling pre-cleaning, dehulling/ de-husking, paddy separation, whitening/ polishing, weighing, packing, etc. • Carry out regular repair and maintenance of the rice mill and relevant equipment • Follow the applicable food				

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			hygiene, and health and safety standards **A Rice Mill Operator must know and understand:** • Applicable food hygiene, and health and safety standards • Process of setting up rice mill for use and operating it for rice milling • Process of carrying out regular repair and maintenance of rice mill				
Oilseed Mill Operator	4	An Oilseed Mill Operator is responsible for carrying out various processes in an oilseed mill such as pre-cleaning, cleaning, decortication, crushing/ grinding/ flaking, conditioning, oil extraction, oil clarification, etc. The individual uses a variety of machineries for the purpose and is responsible for preparing the machineries for use; using them as per the Standard Operating Procedure (SOP); and carrying out their regular repair and maintenance.	**An Oilseed Mill Operator must be able to:** • Follow the applicable food hygiene, and health and safety standards • Prepare the oilseed mill for the milling operation • Carry out various processes during oilseed milling such as pre-cleaning, cleaning, decortication, crushing/ grinding/ flaking, conditioning, oil extraction, oil clarification, etc. • Maintain the oilseed mill in working condition through regular repair and maintenance **An Oilseed Mill Operator must know and understand:**				

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Applicable food hygiene, and health and safety standards • How to prepare and operate the oilseed mill • How to carry out regular repair and maintenance of oilseed mill				
Gram Flour Mill Operator	4	A Gram Flour Mill Operator is responsible for carrying out various processes in for milling gram, such as cleaning, conditioning, breaking, scalping, purification, reduction, dressing, finishing, and packing. The individual uses a variety of machineries and equipment for the purpose, such as milling separator, aspirator, dust collector, double roller mill, sifter, etc. The person is responsible for using these machineries and equipment as per the Standard Operating Procedure (SOP) and carrying out their regular repair and maintenance.	**A Gram Flour Mill Operator must be able to:** • Set up the gram flour mill for the milling of gram • Carry out various processes during gram flour milling such as cleaning, conditioning, breaking, scalping, purification, reduction, dressing, finishing, etc. • Pack the processed gram flour in the appropriate packing material • Maintain the gram flour mill in working condition through regular repair and maintenance • Follow the applicable food hygiene, and health and safety standards **A Gram Flour Mill Operator must know and understand:** • SOP for preparing, operating, and maintaining the gram flour mill				

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Applicable food hygiene, and health and safety standards				
Flour Packaging Machine Operator	4	A Flour Packaging Machine Operator is responsible for handling the milled flours, preparing, and operating the packaging machine and performing general maintenance of the flour packaging machine.	**A Flour Packaging Machine Operator must be able to:** • Protect the packaging contents from spoilage & spillage. • Design appropriate packaging. Carry out maintenance of the packaging equipment. **A Flour Packaging Machine Operator must know and understand:** • Criteria for selecting suitable packing material for different types of flour types. • Various methods packing food items using the relevant packaging equipment. • How to perform general maintenance of the packaging equipment. • Applicable food hygiene and safety standards.		✓	✓	✓
Oil Pouch Packing Machine Operator	4	An Oil Pouch Packing Machine Operator is responsible for handling the milled oils from oilseeds. Also performing general maintenance of the oil pouch packaging machine.	**An Oil Pouch Packing Machine Operator must be able to:** • Protect the packaging contents from spoilage & spillage. • Design appropriate packaging.		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Carry out maintenance of the packaging equipment. **An Oil Pouch Packing Machine Operator must know and understand:** • Criteria for selecting suitable packing material for different types of Oil types / pack size. • Various methods packing food items using the relevant packaging equipment. • How to perform general maintenance of the packaging equipment. • Applicable food hygiene and safety standards.				
Mill Supervisor	5	A Mill Supervisor is responsible for scheduling and allocating tasks to the workers, monitoring their performance, and ensuring correct functioning of the machineries and overall maintenance of the mill.	**A Mill Supervisor must be able to:** • Schedule activities and allocate task • Maintain general safety and discipline • Measure qualities of finished product **A Supervisor must know and understand:** • Relevant safety and security procedures • Product quality evaluation criteria w.r.t national and international standards	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data			✓	✓
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.				

Table 99: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

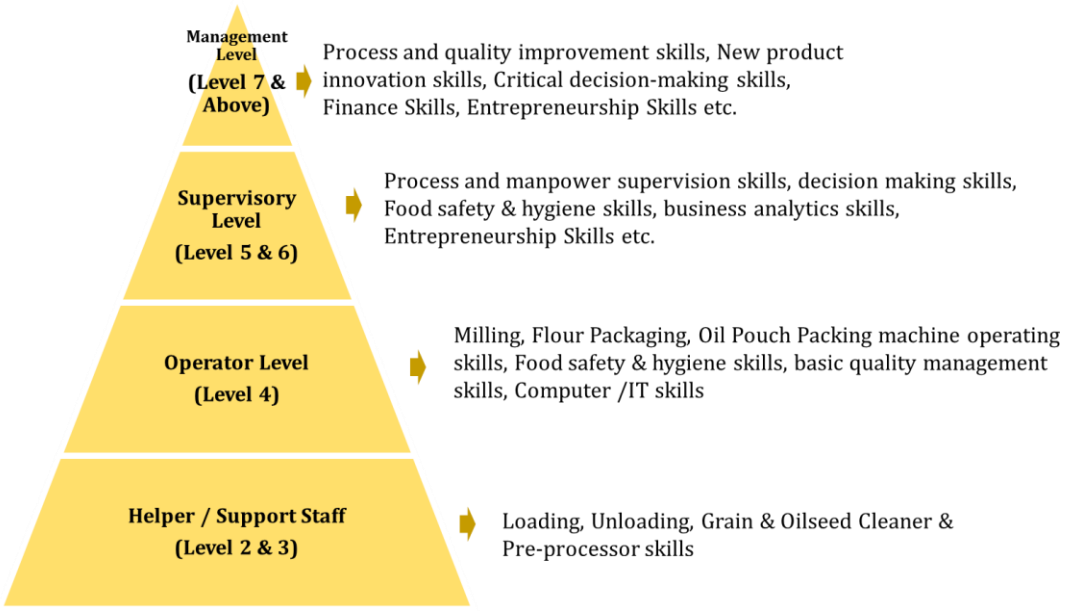


Figure 109: *Skill Sets required across multiple levels in the sector*

11.8 Expectations from the Industry Stakeholders

Training program with specific focus on the milling industry required

- Within the Milling industry, there is a need to introduce basic courses on crushing, and refining
  - There can be additional courses oil milling machine and basic functions of machines.
- Along with the basic course, there is a need to train the millers on food safety along with the GMP and HACCP practices

Requirement for providing machine maintenance courses for millers

- An example of good practice in US is the Association of Operative Millers (AOM) Kansas, who conduct courses for a week on mill maintenance, quality and operation systems which can be replicated in India to trained millers who are already employed in milling industry and those who are interested in it
- With most companies having an automated line, it is important that several small-time repair and maintenance works are attended to locally without calling the equipment companies and this can easily be done
- Most equipment companies are willing to contribute to designing a course which can address this need and also help in training the initial batches which can then be replicated.

Training the Candidates on Latest Technology

- Candidates across functions are required to know various functionalities (Grain silo, Milling, R&D, Warehouse operations, etc.).

- Increased use of automation and control systems mean that engineering and computer skills needs to the adequate across level of employees.
- The existing QPs of FICSI focuses on core functions of milling created few years back and it is expected to be updated with the latest technology in the industry

Visibility of Training Institutes offering technicians

- There are very few institutes which are well known in the industry like CFTRI, CSMT (Choyal School of Milling Technology) which offers technical programs on various milling technology
- With the limited awareness of these institutes, it is expected that more institutes to be operated across states.
- Some of the Machine suppliers are ready to collaborate with the education institutes to offer practical training at their plant.

  Joint efforts of all the stakeholders (MoFPI / FICSI; Machinery Manufacturers; Millers & Education Institutes) will reduce the skill gap in the industry.

Chapter 12: Sub-Sectoral Analysis – Beverages (Tea and Coffee)

12.1 Market summary

Indian tea is among the finest in the world owing to strong geographical conditions, heavy investment in tea processing units, continuous innovation, augmented product mix and strategic market expansion. India is the 2nd largest producer and exporter of tea in the world. India is also Asia's third-largest producer and exporter of coffee. Almost 80% of Indian coffee is exported. The trend is likely to continue in the coming years. The unbranded market by value is around 30-35% of the overall market. Green tea is estimated to be ~3% of the branded category. When it comes to domestic consumption, tea is considered as common man's drink and is consumed multiple times during the day. However, tea drinkers are now preferring multiple flavours. Among the milk tea drinkers, masala tea, ginger tea, elaichi tea etc. are gaining preference whereas, among the non-milk tea drinkers, green tea and lemon tea are fast becoming the popular choice after plain liquor tea. Green tea is fast becoming a popular drink across age due to its perceived health benefits, and is fast becoming one of the popular products in the health and wellness segment thereby driving the growth of Indian tea industry. On the other hands, influence of western culture, entry of international brands, availability and affordability, change in drinking habits among the working populations etc. are driving the growth of Indian Coffee market and likely to do so in the coming years.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	1,516
No. of registered units	1,075
Past Growth rate (CAGR) (FY' 15 – FY' 20)	1.8%
Total Number of Employees (FY' 20)	1,05,100 nos.
Overall Exports (FY'20)	INR 8,736 Crs.
Expected Market ('000 MT) FY' 2030	2,450
Future growth rate (FY' 20 – FY' 30)	4.9%
Total Employee Estimation (FY' 30)	1,69,870 nos.
Overall Employment Additions (FY' 20 – FY' 30)	64,770 nos.

Table 100: Beverages (Tea and Coffee): Key Industry Indicators

12.2 Present State of the Industry & Future Outlook

Tea Industry

The Indian tea market, during FY 21[43], is estimated to be ~ 1200 Mn Kgs by volume and ~Rs. 26,000 Crores[44] by value. The unbranded market by value is around 30-35% of the overall market. Green tea is estimated to be ~3% of the branded category.

Indian tea is among the finest in the world owing to strong geographical conditions, heavy investment in tea processing units, continuous innovation, augmented product mix and strategic market expansion. The main tea-growing regions are in the Northeast (including Assam) and in North Bengal (Darjeeling district and the Dooars region). Tea is also grown on a large scale in Tamil Nadu and Kerala in south India.

Value chain of Tea Market in India

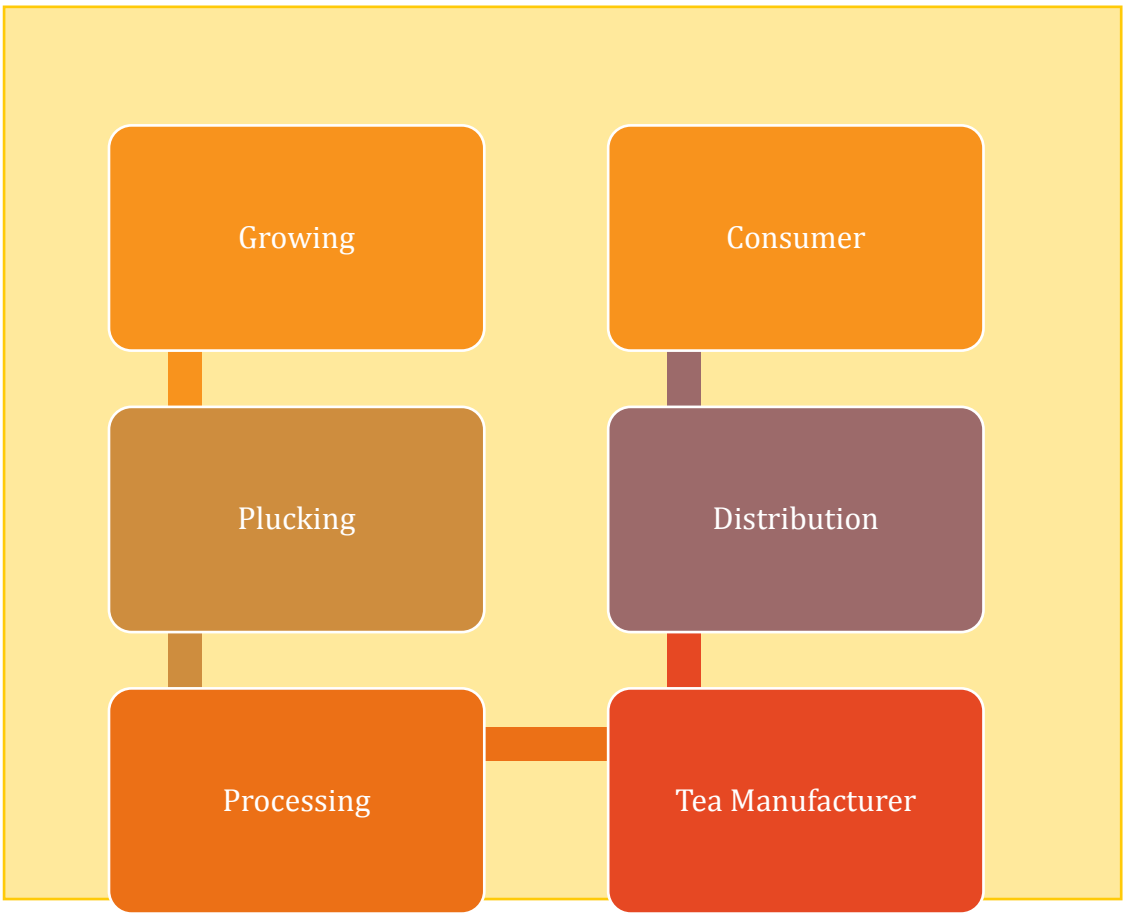


Figure 110: *Value chain of Tea market in India*

[43] Tea Board of India
[44] Analyst Report – Tata Consumer Products

Manufacturing Clusters:

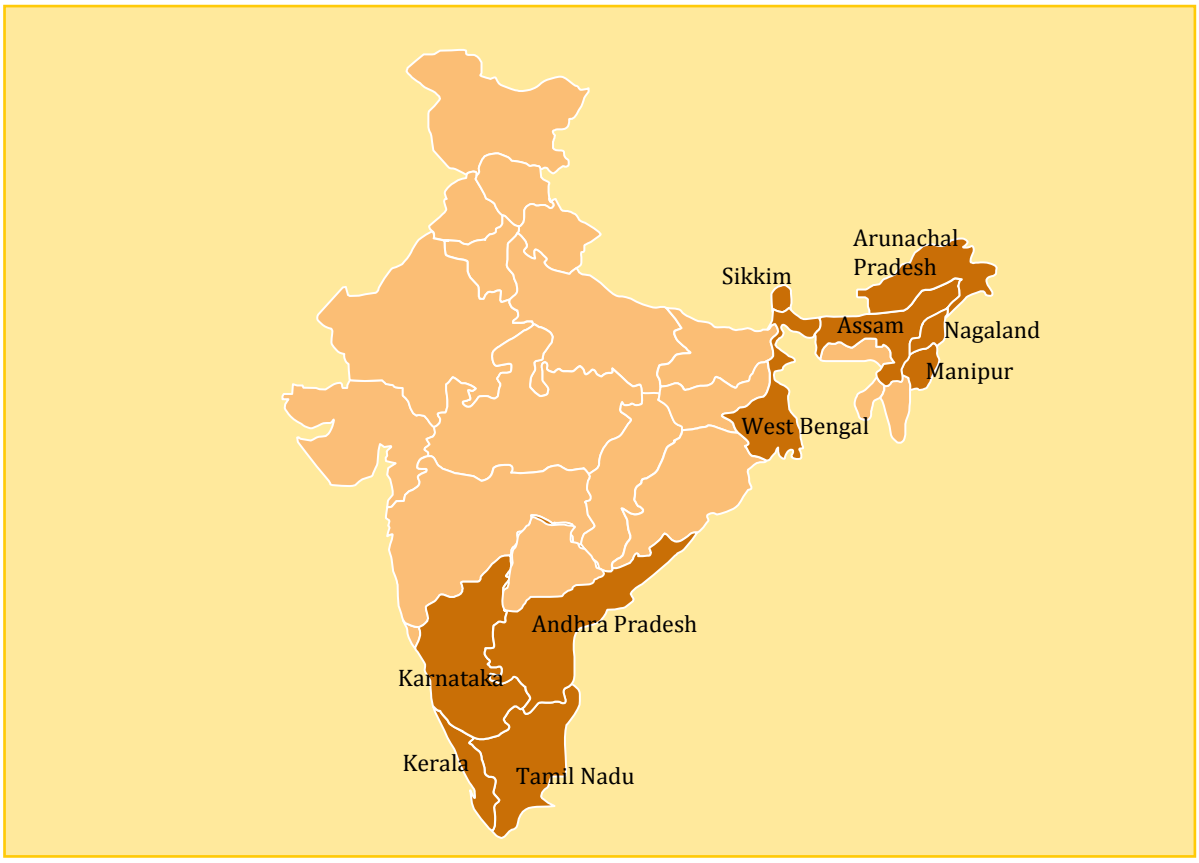


Figure 111: *Manufacturing Clusters*

Top 10 states account to 94% of total employment in the Beverages (Tea & Coffee) industry

Coffee Industry

Karnataka accounts for over 50% of the coffee land under cultivation in India at 226,244 hectares[45]. Karnataka also has the highest soil productivity at 983 kg's per hectare in contrast to Tamil Nadu which has the lowest soil productivity among the three states at 519 kg's per hectare. Although Kerala has the marginally low soil productivity at 774 kg's per hectare but it has comparative advantage versus Karnataka and Tamil Nadu in terms of labour utilization.

Kerala employs an aggregate ~44,000 people in its coffee farm lands but at a unit level in terms of coffee produced per labour, Kerala has the highest productivity at 1.5 tons of coffee production per labour[46]. Karnataka and Tamil Nadu states lag behind Kerala on these metrics and this comparative advantage of Kerala is possible because of more mechanization of coffee farm lands versus that of Karnataka and Tamil Nadu.

[45] Coffee Board of India
[46] ICO.ORG, Coffee Board of India

Value chain of Coffee Market in India

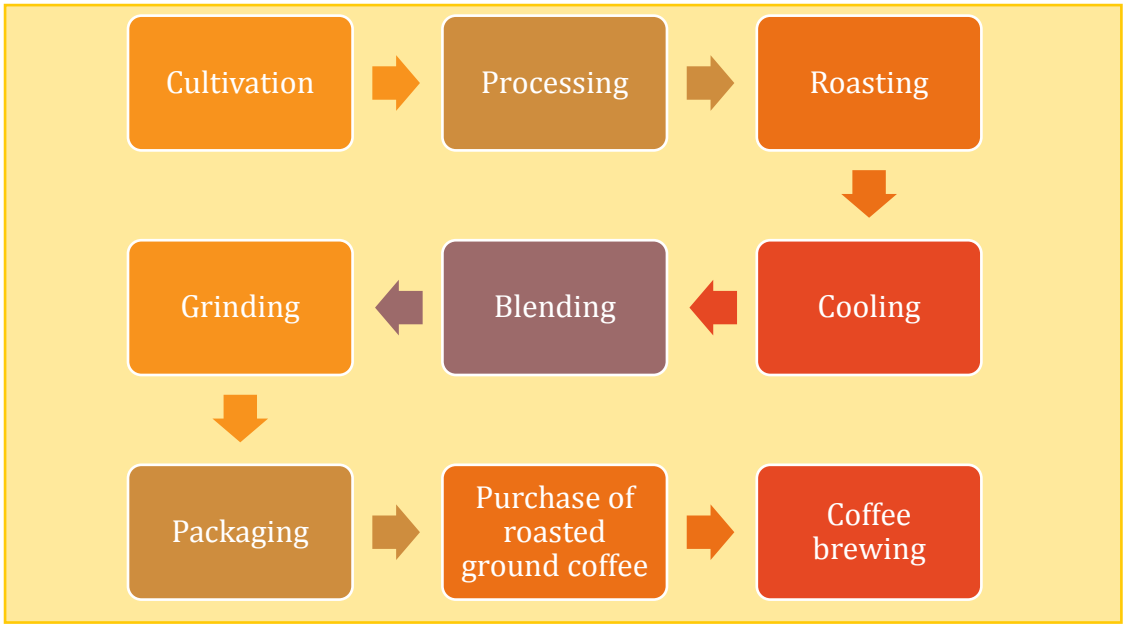


Figure 112: *Value chain of Coffee Market in India*

Market Overview - Tea Industry

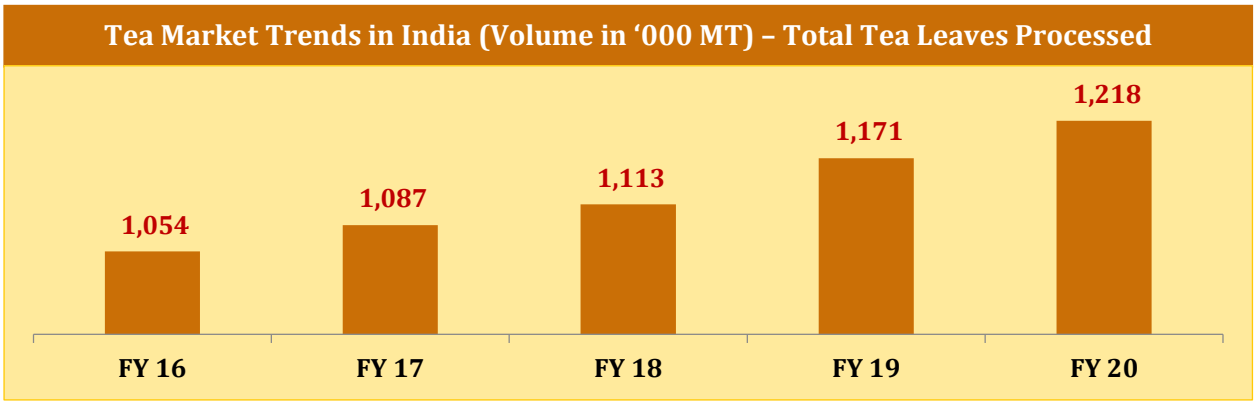


Figure 113: *Tea Market Trends in India (Volume in '000 MT) – Total Tea Leaves Processed*

Source: Tea Board of India & Discussion with SMEs

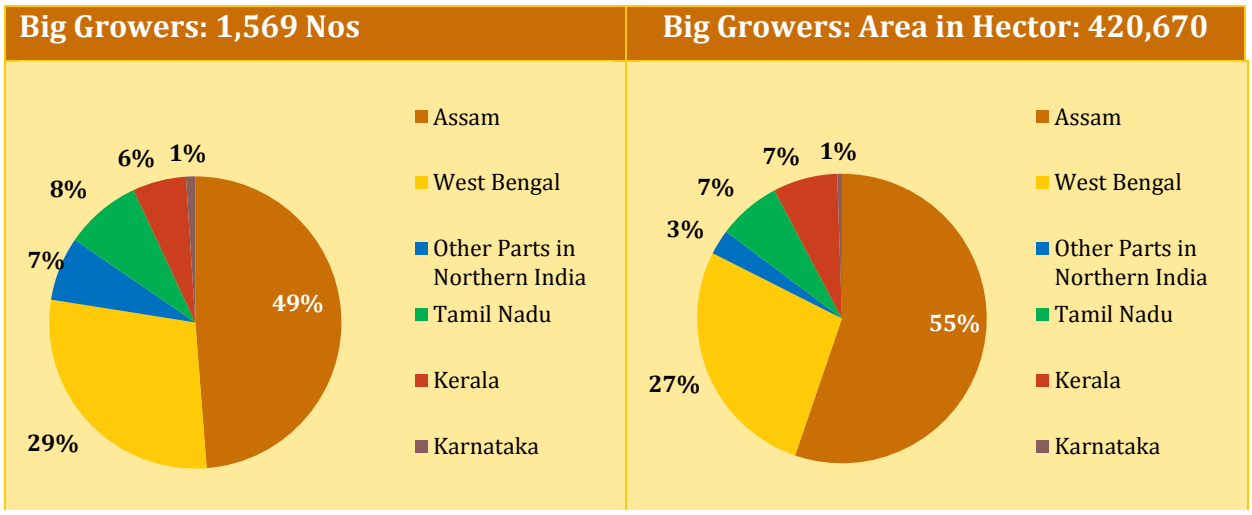


Figure 114: *No. of Big Growers: By State*

Figure 115: *Area of Big Growers: By State*

Source: Tea Board of India

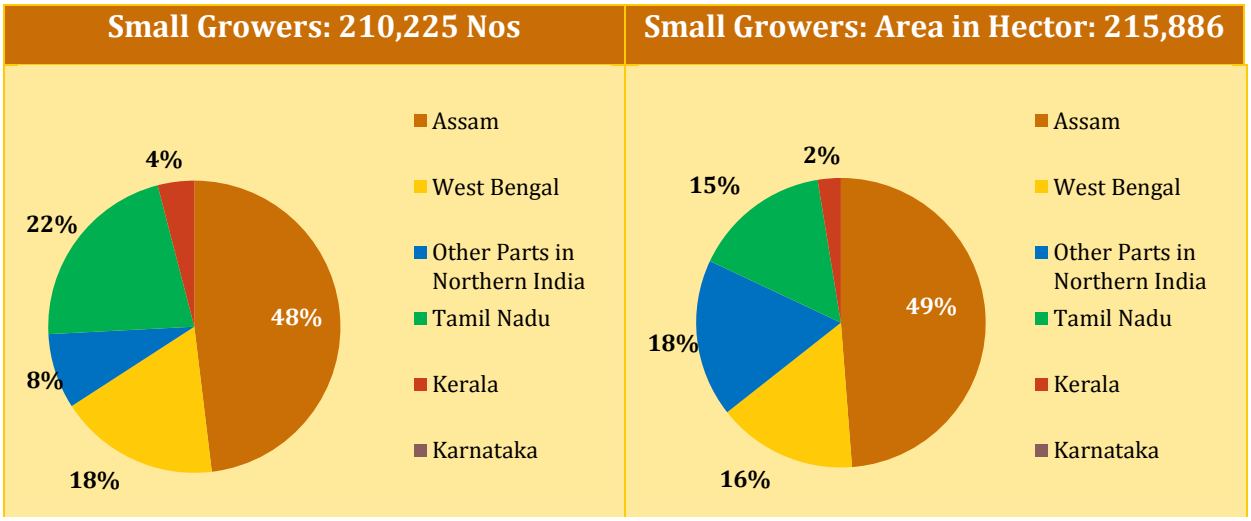


Figure 116: *No. of Small Growers: By State*

Figure 117: *Area of Small Growers: By State*

Market Overview – Coffee Industry

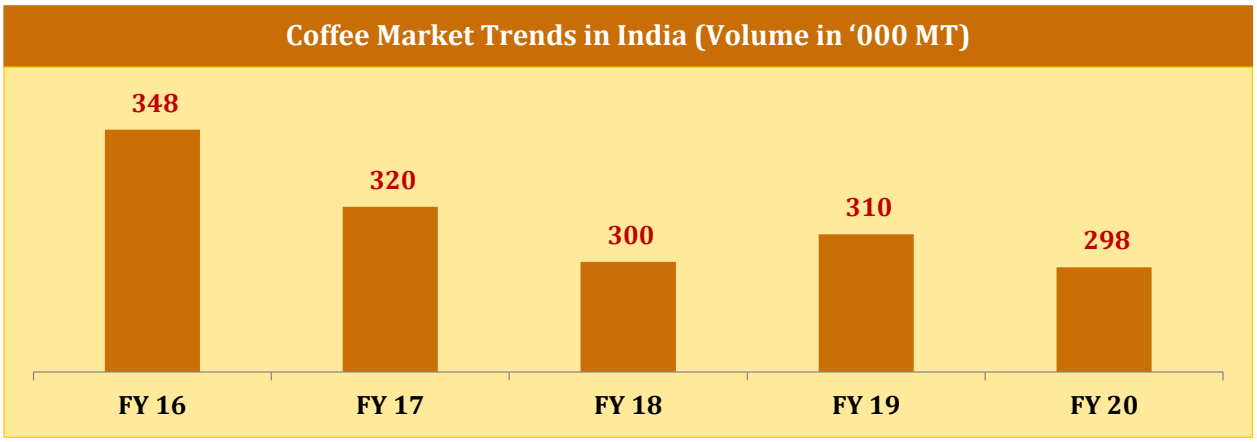


Figure 118: *Coffee Market Trends in India (Volume in '000 MT)*

Source: Coffee Board of India

State wise Coffee production for FY 21 is 298 Mn Kg

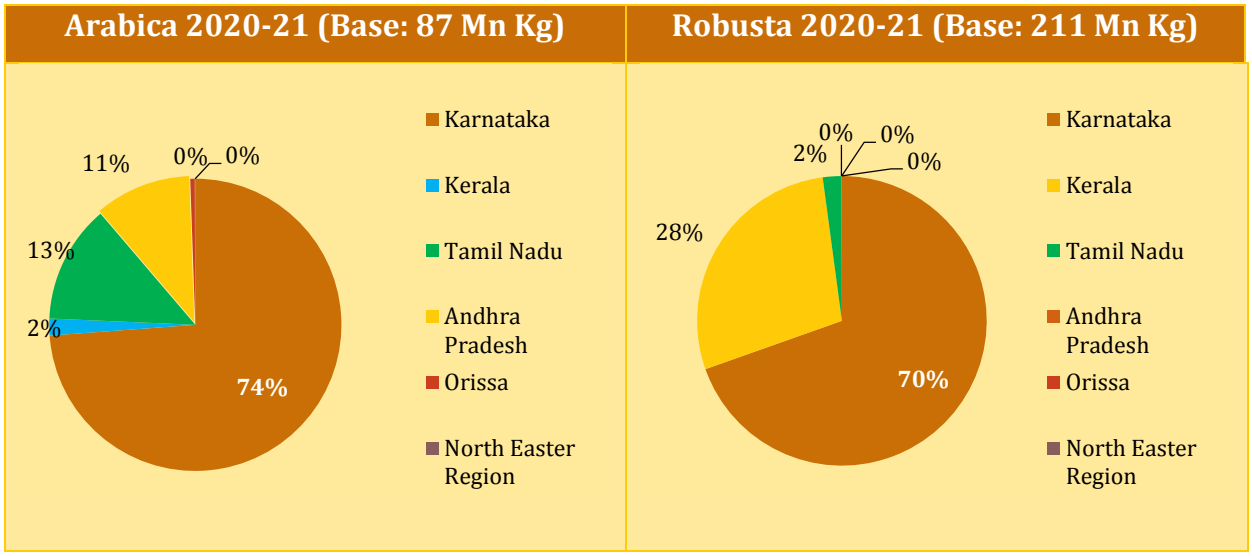


Figure 119: State wise Coffee production for FY 21: By type

Source: Coffee Board of India

12.3 Present Employment Scenario & Analysis

Category of the Companies by Revenue

Category of the Company	Definition (Revenue Range)	Remarks
Micro Enterprises	< Rs 5 Cr	Micro and small enterprises are primarily small-scale manufacturer / processors attached to small plantations.
Small Enterprises	RS 5.1 – 50 Cr	
Medium Enterprises	Rs 50.1 – 250 Cr	Medium-Sized Enterprises predominantly exporters and also purchases from small plantations for further processing.
Large Enterprises	> Rs 250 Cr	Large Sized Enterprises are organized players having a strong brand presence in India and also exports to other countries.

Table 101: Category of the Companies by Revenue

12.3.1 Sample Coverage by Categories of Companies & Region

Category of the Company	Sample Coverage (N)	East	South
I. Micro Enterprises	**32**	**44%**	**56%**
II. Small Enterprises	**48**	**40%**	**60%**
III. Medium Enterprises	**17**	**41%**	**59%**
IV. Large Enterprises	**5**	**40%**	**60%**
Total	**102**	**41%**	**59%**

Table 102: Sample Coverage by Categories of Companies & Region

12.3.2 Total No. of Employees

Past Trend of employment in the Tea & Coffee Industry

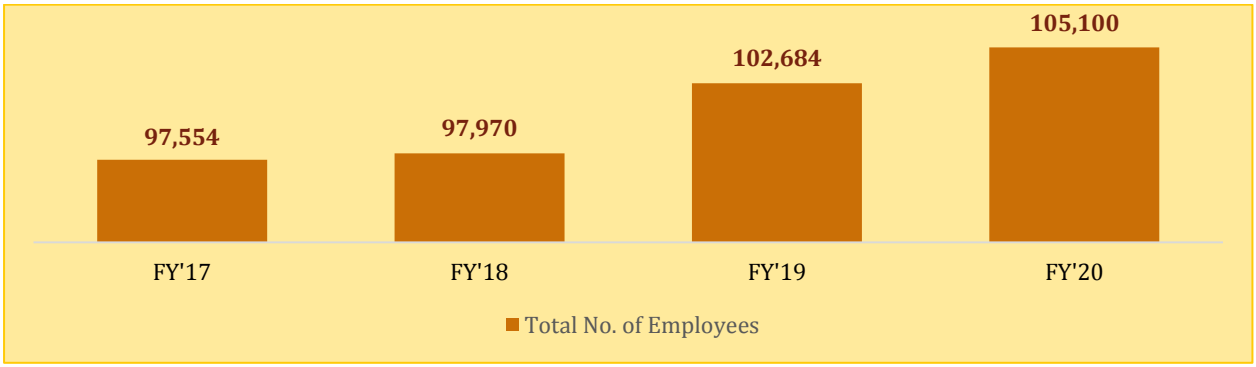
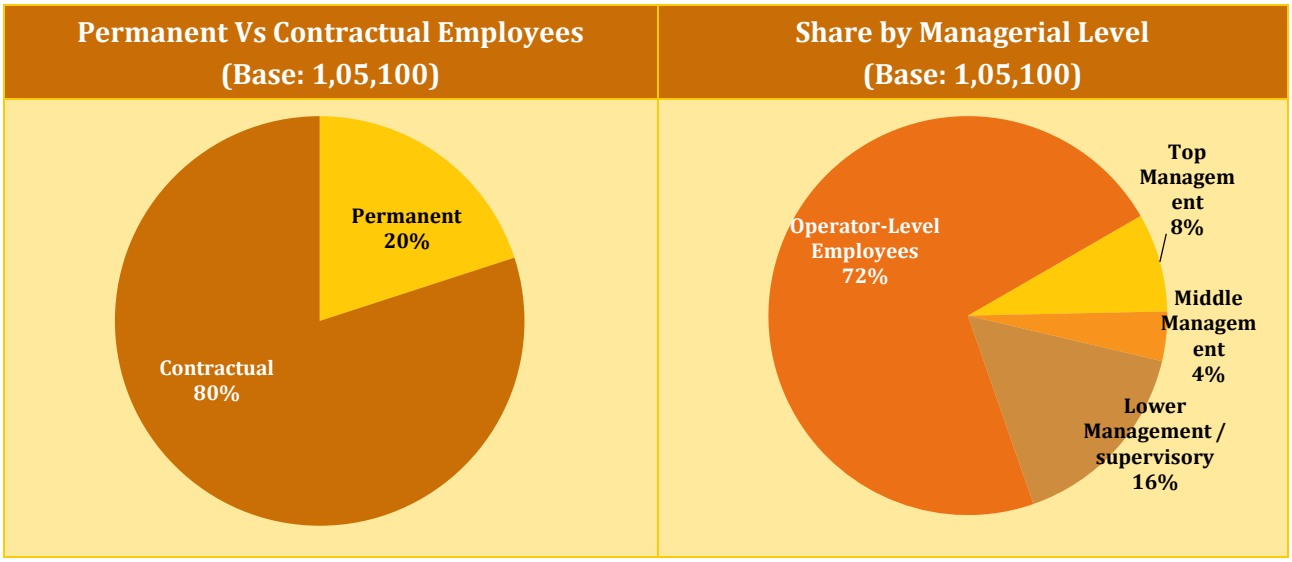


Figure 120: Past Trend of employment in the Tea & Coffee Industry

Source: Feedback Analysis

Share of Employees (FY' 20) Break by Different Category



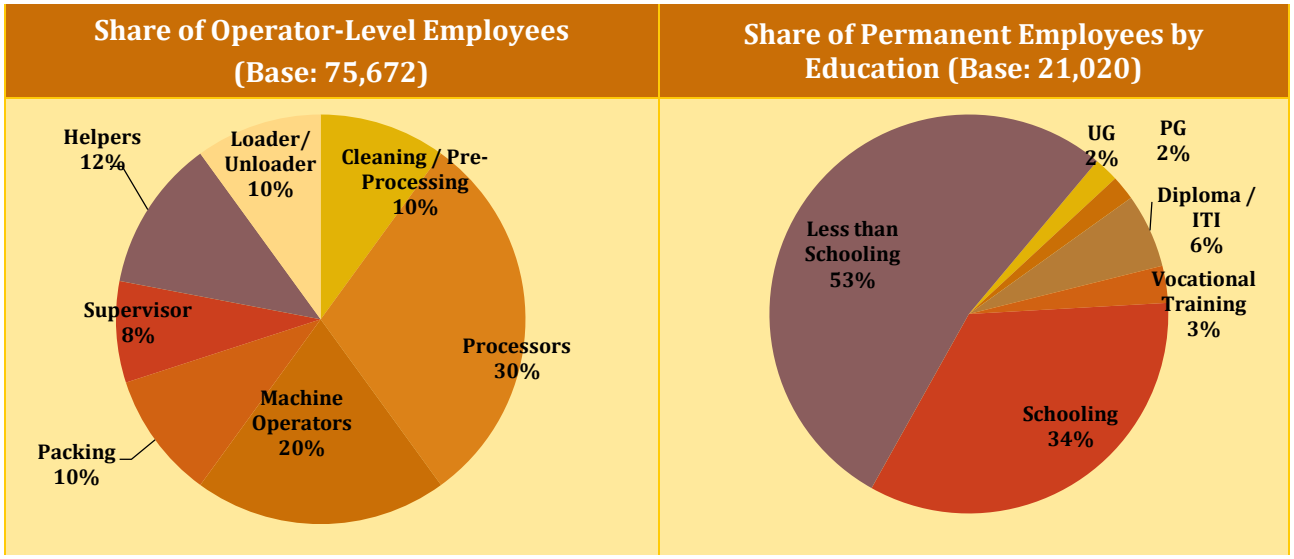


Figure 121: Share of Employees (FY' 20): By Different Category

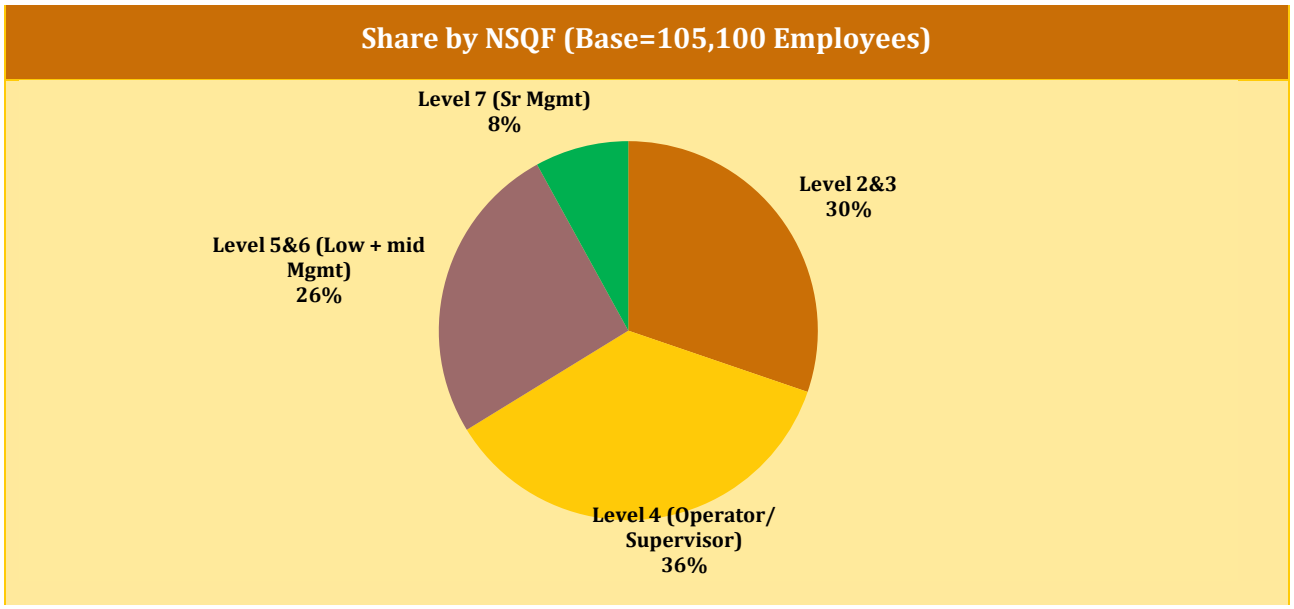


Figure 122: *Share of Employees (FY'20) : By NSQF levels*

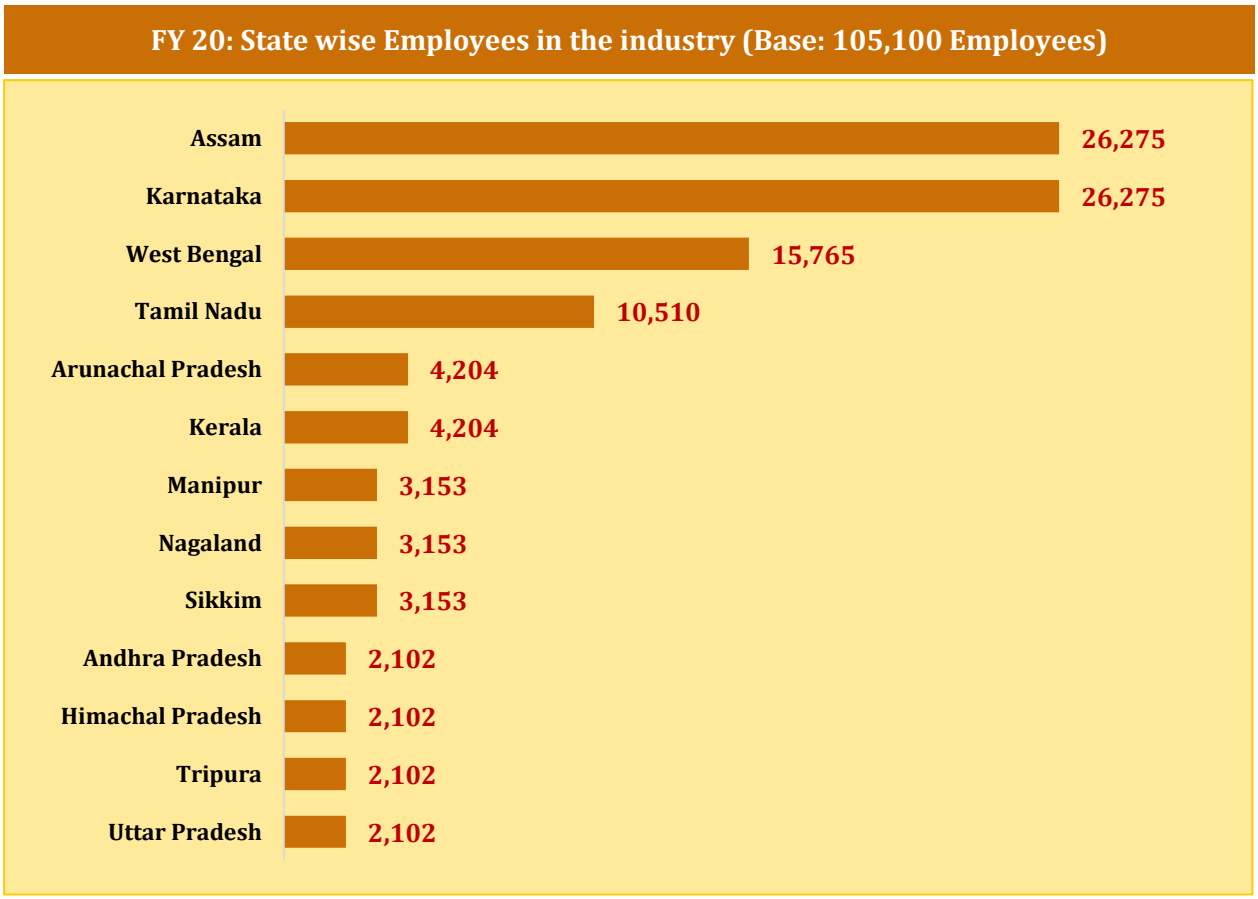


Figure 123: State wise Employees in the Industry (FY'20)

Source: Feedback Analysis

Top 13 states account to 100% of total employment in the industry

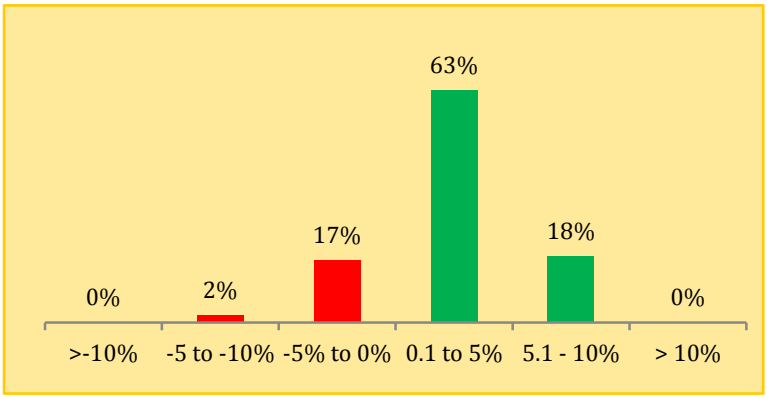
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Pre-Processing Labours	Tea: Washing the leaf and load it in the first process of Spreading the leaf on Withering Trough. Coffee: Grading; Sorting of the beans which is done by size and weight, and beans are also reviewed for colour flaws or other imperfections.	3	✓	✓	✓	✓
2	Processing Labours	Labours involved in various process, such as… 1. Natural or Artificial Withering 2. Rolling / Rotorvane 3. Fermentation 4. Drying 5. Milling the Beans (Only Coffee)	4	✓	✓		

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
		6. Sorting Roasting the coffee (Only Coffee)					
3	Machine Operators	Machine operators operate machines which does cutting, tearing and curling. This process is started after rolling or rotorvane. Machines are primarily used to cut leaves in uniform sizes.	4			✓	✓
4	Packer	After sorting, grading tea is packed in tea chest/jute bags of standard size for auction or packed for retail market	3		✓	✓	✓
5	Shift Supervisor	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
6	Helpers	Misc. work including cleaning plants, machinery after every batch, etc.	3	✓	✓	✓	
7	Loader / Unloader	Material handling, loading & unloading products.	3	✓	✓	✓	✓
8	Sales and Distribution Support	Sales executives / Distribution to the channel partners	4	✓	✓	✓	

Table 103: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

12.3.3 Past Growth of Employees (FY'17 – FY'20)



- <20% of the enterprises have experienced degrowth in their manpower in the past 3 years.
- 63% have indicated that their manpower has grown marginally (up to 5%).

Figure 124: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

12.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

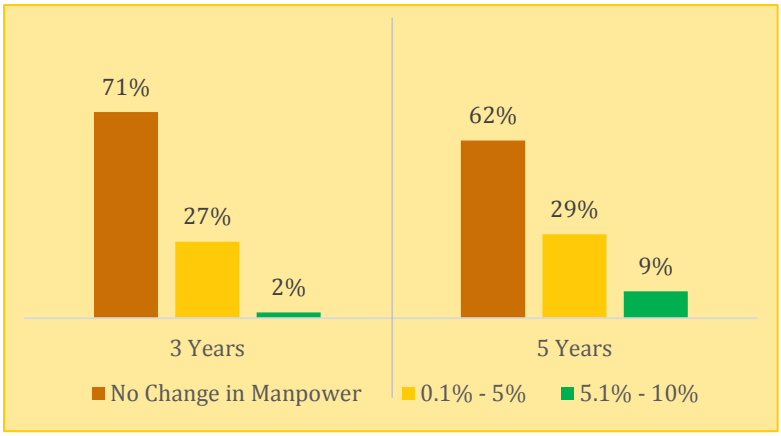
Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Plan to invest on technology	0%	0%	18%	100%
Plan to invest on new equipment	12%	21%	41%	100%

Plans	Micro	Small	Medium	Large
Plan to enhance the production capacity	9%	50%	59%	100%
Plans to launch new products	6%	0%	12%	40%
Plans to increase exports	3%	25%	47%	100%
Plans to invest on R&D	0%	0%	12%	100%

Table 104: Future Plans of the Companies covered

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- 2 - 3% in next 3 & 5 years

Figure 125: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

Source: Feedback Analysis

12.4 Recruitment & Training Practice

Recruitment Practice

Source of labourers are locals from nearby villages and town. Walk-in is the key source of recruiting candidates across Operational level and Lower-level employees.

Following are the key institutes encountered during survey from where the candidates / employees have got trained or graduated before joining the enterprise.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal training institutes offering food technology / food science programs
Middle Management	• Formal training institutes offering food technology / food science programs
Lower Level Management	• Most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 105: Recruitment Practice

Training Practice

Overall, ~25% of the companies covered were providing training across levels, whenever an employee joins the firm (On-the-Job training).

% of Companies offering training

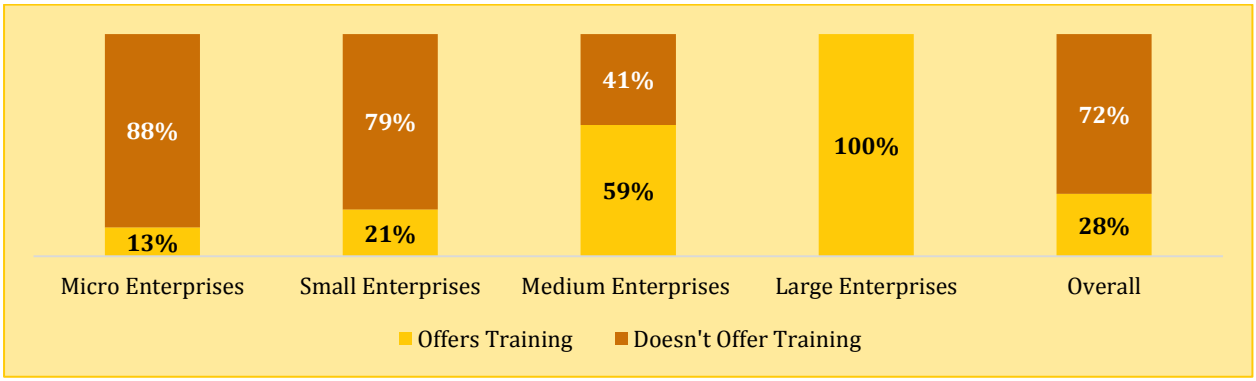


Figure 126: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered (Encountered in Primary Interviews)

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Processing Operations (Tea)	Proper washing and removal of foreign materials from the leaves before spreading for Withering	Operator Level Employees	✓	✓	✓	✓
Pre-Processing Operations (Coffee)	Grading & Sorting of the beans by size, weight, colors, etc.	Operator Level Employees	✓	✓	✓	✓
Processing Methods (Tea)	Steps involved in the process as 'on the job' training. The topics includes of natural withering; artificial withering, rolling, fermentation,	Operator Level Employees; Lower-Level Employees; Supervisors / Managers	✓	✓	✓	✓
Processing Methods (Coffee)	Drying and milling of beans	Operator Level Employees; Lower-Level Employees; Supervisors / Managers	✓	✓	✓	✓
Operations Management	Training on overall operations, manpower	Supervisors / Managers			✓	✓

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
	allocation, inspection, etc.					
Supervision of product handling activities	Appropriate packing methods, latest technology, equipment operations, etc.	Supervisors / Managers			✓	✓
Plant Maintenance	Maintenance checklist for equipment (processing and packing)	Operator Level Employees & Lower-Level Employees (Technicians / Machine Operators)				✓
Packing	Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio			✓	✓	✓

Table 106: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely Satisfied and 1 is extremely dissatisfied)

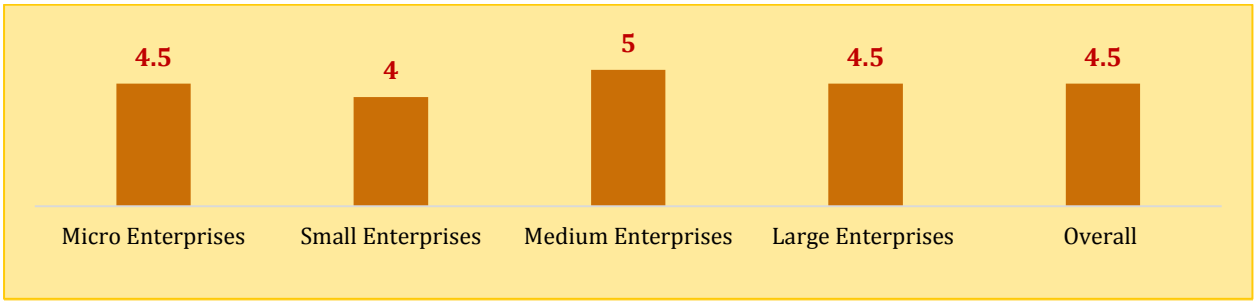


Figure 127: Effectiveness of Training

Source: Feedback Analysis

12.5 Challenges related to Skill Availability Vs Skill Gaps

Skill acquisition challenges

Limited Skilled / Semi Skilled employees available

- Employees are primarily sourced within the region / location of the processing plant. People joining the processing plants are through reference with limited knowledge on processing.
- Most of the processing plants are associated with the tea / coffee estates where the cultivation employees also join the pre-processing functions.

Poor Knowledge on sourcing Trained Labour

- Companies are not aware of training institutes for the operator level or lower level employees.

Skill gaps by specific job roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Plant Manager / Production Manager	Mid Management NSQF: 6	• Knowledge on manufacturing techniques • Manufacturing operations • Tea Tasting & Blending	• Tea Tasting & Blending is one area where plant manager needs more training			✓	✓
Supervisors	Lower-Level Management NSQF: 5	• Overseeing operations including material handling across functions • Equipment operations and maintenance across functions	• Poor knowledge on various product grading (e.g., Green Tea, Black Tea Grade, etc.)	✓	✓	✓	
Maintenance Officer	Lower-Level Management NSQF: 4	• Maintenance of machineries	• Knowledge on latest equipment	✓	✓	✓	
Loading / Unloading Laborer's	Operator Level Employees	• Materials Handling	• Inability to learn and operate across functions	✓	✓	✓	✓

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
	NSQF: 3						
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygiene awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓		

Table 107: Key job roles and their required skills and skill gaps

12.6 Future Projection – Sector & Employment

Projected growth of Tea & Coffee production in India

Based on discussions conducted with the Visionaries and Industry experts, Indian Tea & Coffee production likely to reach approx. 2.450 Mn MT by FY'30. This indicates CAGR of approx. 5%.

Reasons for such growth are the followings:

- India is the 2nd largest producer and exporter of tea in the world. India is also Asia's third-largest producer and exporter of coffee. Almost 80% of Indian coffee is exported. The trend is likely to continue in the coming years.
- When it comes to domestic consumption, tea is considered as common man's drink and is consumed multiple times during the day. However, tea drinkers are now preferring multiple flavours.
- Among the milk tea drinkers, masala tea, ginger tea, elaichi tea etc. are gaining preference whereas, among the non-milk tea drinkers, green tea and lemon tea are fast becoming the popular choice after plain liquor tea.
- Green tea is fast becoming a popular drink across age due to its perceived health benefits, and is fast becoming one of the popular products in the health and wellness segment thereby driving the growth of Indian tea industry
- On the other hands, influence of western culture, entry of international brands, availability and affordability, change in drinking habits among the working populations etc. are driving the growth of Indian Coffee market and likely to do so in the coming years

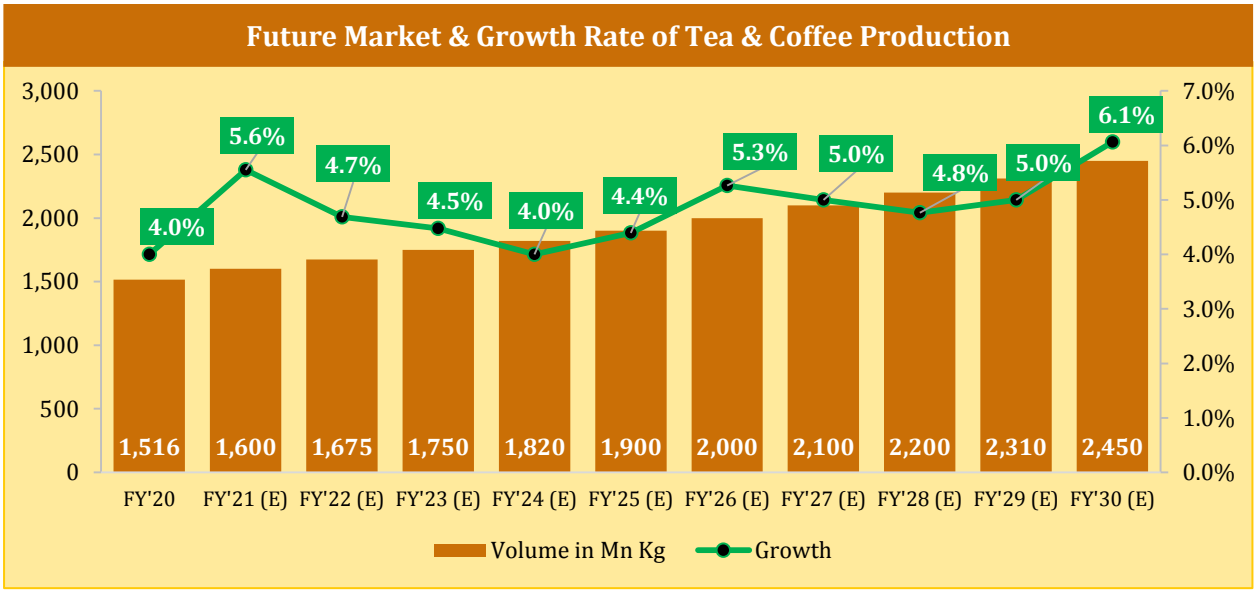


Figure 128: *Future Market & Growth Rate of Tea & Coffee Production*

Source: Tea Board of India & Coffee Board of India, Subject Matter Experts & Visionaries

Processing capacity and investment required in Tea & Coffee sector

Parameter	Unit	Values
FY'20 Production	'000 MT	1,516
FY'30 Production (E)	'000 MT	2,450
Increase in production between FY'20 & FY'30	'000 MT	934
Considering 80% capacity utilization, additional processing capacity required	'000 MT	1,168
Investment norm	Rs. / MT	37,500
Total Investment required	**Rs. Cr.**	**4,379**

Table 108: *Processing capacity and investment required in the sector*

Source: Plant / Equipment Manufacturers; Tea Board of India & Coffee Board of India

The government has allowed 100% FDI in both Tea & Coffee plantations. Tea Board of India along with Ministry of Commerce & Industry, providing assistance under Scheme for setting up Tea Boutiques in India for Domestic Promotion.

In addition, coffee exports are also covered under the Merchandise Exports from India Scheme (MEIS) and Duty Drawback schemes of the Government of India.

The MEIS reward rate can range from 3-7 percent of the FOB value of exports, depending on the harmonized tariff schedule and coffee classification (green coffee, roast and ground, or instant/soluble).

Select ongoing and upcoming projects in Tea & Coffee sector in India

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Indus Coffee Pvt. Ltd.	Naidupeta SEZ Freeze Dried Coffee Manufacturing Plant Project	Nellore, Andhra Pradesh	New Unit	304
2	Assam Industrial Devp. Corpn. Ltd.	Jorhat Tea Park Project	Jorhat, Assam	New Unit	126
3	CCL Products (India) Ltd.	Coffee Agglomeration & Packaging (Kuvvakolli) Project	Chittoor, Andhra Pradesh	New Unit	120
4	Tata Consumers Products Ltd.	Tea Packaging (Gopalpur) Project	Ganjam, Odisha	New Unit	100
5	Assam Industrial Devp. Corpn. Ltd.	Chaygaon Tea Park Project	Kamrup, Assam	New Unit	26
6	Mohani Tea Leaves Pvt. Ltd.	Jalpaiguri Tea Factory Project	Jalpaiguri, West Bengal	New Unit	25
7	Vidya Herbs Pvt. Ltd.	Tea & Coffee (Hassan) Project	Hassan, Karnataka	New Unit	24
8	Western Coffee Curers	Green Coffee Beans Processing (Hassan Growth Centre) Project	Hassan, Karnataka	New Unit	16
9	AVT Natural Europe Ltd.	Instant Tea (Vazhakulam) Project - Expansion	Ernakulam, Kerala	Capacity Expansion	5
10	Shri Krishna Tea Company	Tea (Guhaigaon) Project	Jorhat, Assam	New Unit	4

Table 109: Select ongoing and upcoming projects in Tea & Coffee sector in India

Source: CMIE & Projects Today

FY'20 employment estimation in Tea & Coffee sector in India

Company Category	Average no. of Employees	FY'20 Total No. of Employees in Tea & Coffee industry	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	1,400	35,000	35%	531	15.2
Medium Enterprises	450	31,500	30%	455	14.4
Small Enterprises	170	30,600	28%	424	13.9
Micro Enterprises	10	8,000	7%	106	13.3
Total		**1,05,100**		**1,516**	**14.4**

Table 110: FY'20 employment estimation in Tea & Coffee sector in India

**Discussion with the Processing Units and SMEs*

Note: LMS classification has been made based on overall revenue of the companies. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection in Tea & Coffee sector in India

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	35%	858	15.2	56,569	21,569
Medium Enterprises	30%	735	14.4	50,912	19,412
Small Enterprises	28%	686	13.9	49,458	18,858
Micro Enterprises	7%	172	13.3	12,930	4,930
Total		**2,450**		**1,69,870**	**64,770**

Table 111: Future employment projection in Tea & Coffee sector in India

**As per discussion with the Processing Units and SMEs, contribution of various types of companies in the Tea & Coffee industry will remain same over next 10 years*

 # Based on discussions with equipment manufacturers and SMEs, there could be marginal adoption of automation / industry 4.0 in the coming years. However, that will have negligible impact on the productivity of the employees. Hence, the same productivity values have been considered for future employment generation potential.

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category

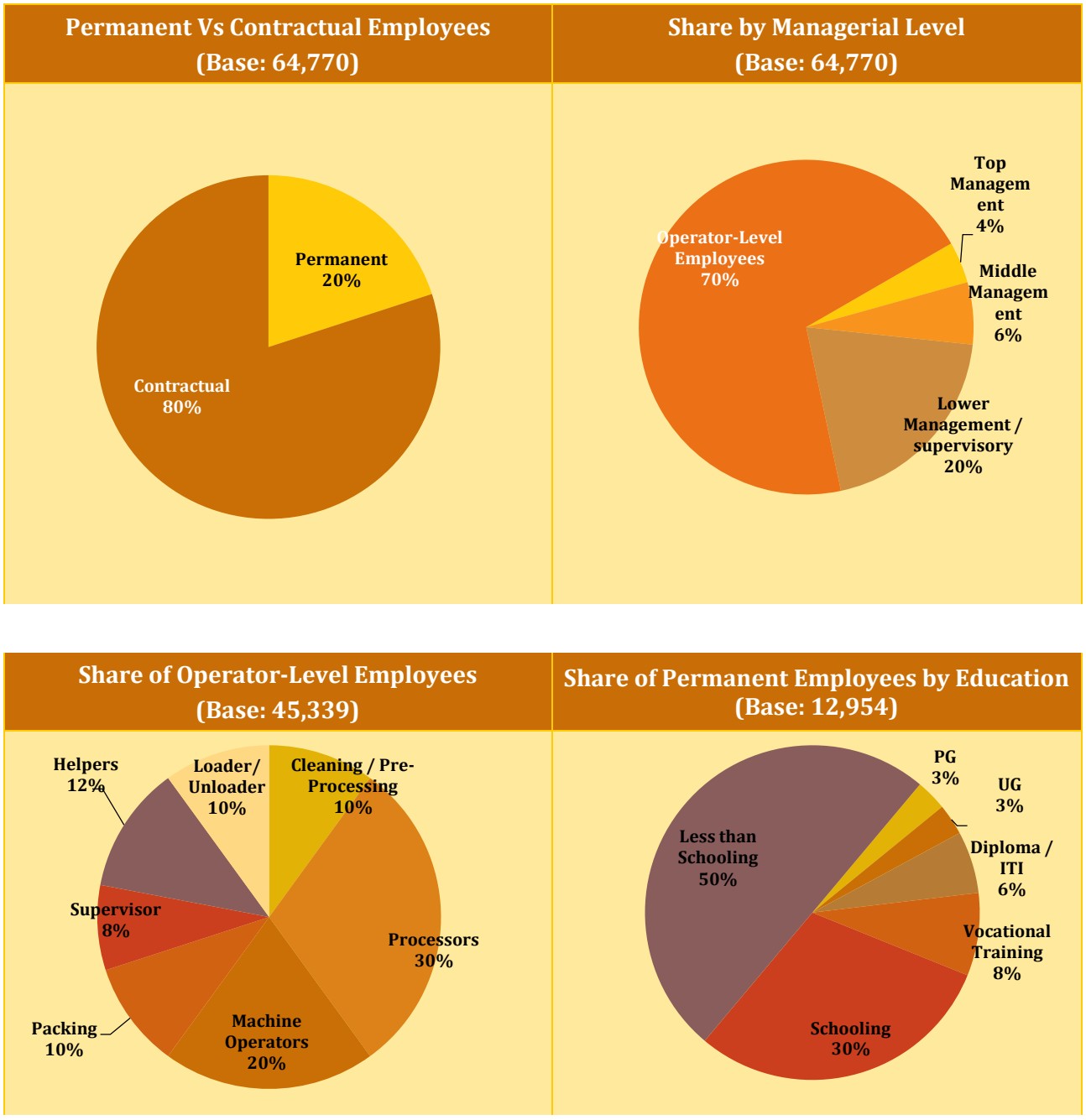


Figure 129: Share of FY'20 - FY'30 Employment Generation potential: By Different Category

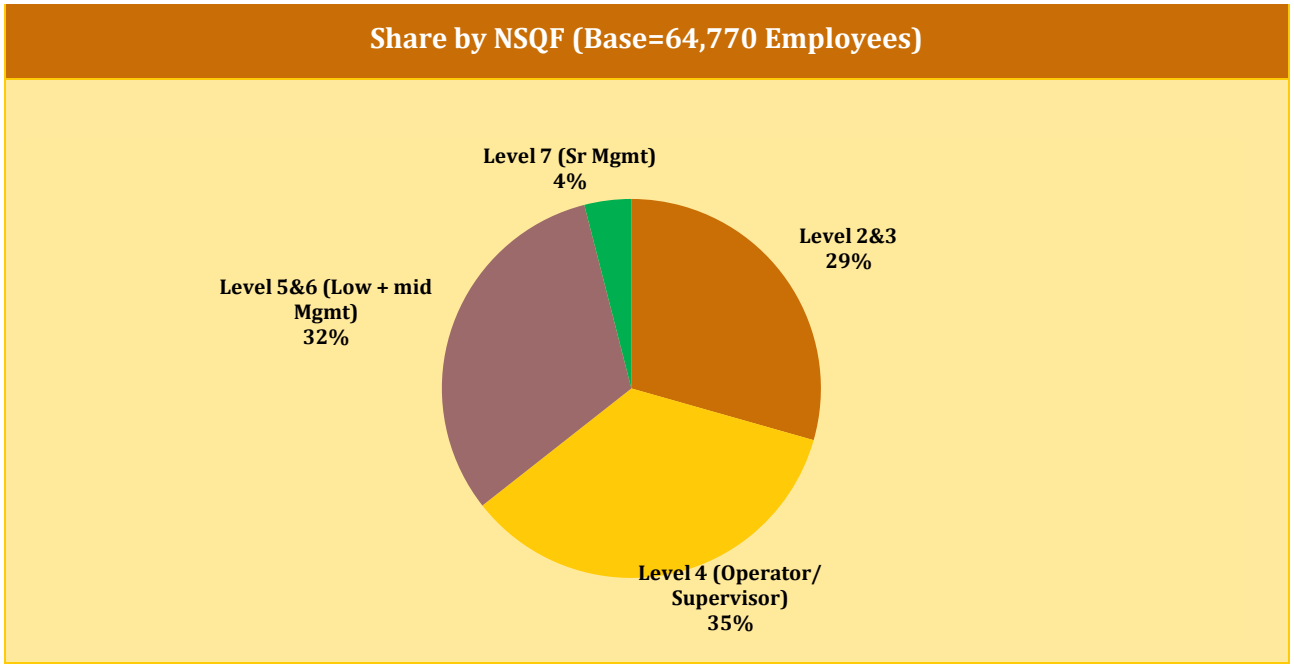


Figure 130: *Share of FY'20 - FY'30 Employment Generation potential: By NSQF levels*

Source: Feedback Analysis

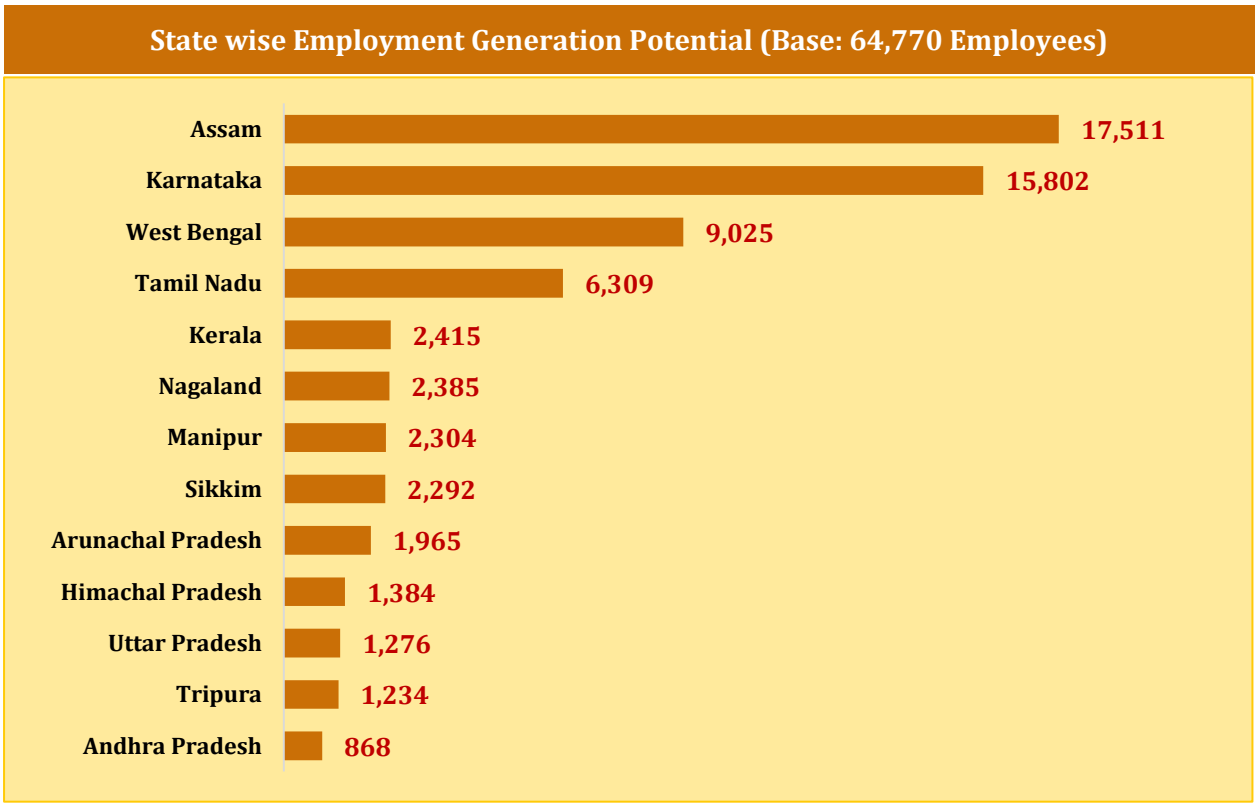


Figure 131: *State wise Employment Generation Potential*

Source: Feedback Analysis

Top 13 states account to 100% of total employment in the industry

12.7 Existing & Emerging prominent job roles which requires Skilling

Tea & Coffee, as a sub-sector, cut across 2 different skill sector council. Plantation / Cultivation related jobs are under the Agriculture and the processing functions are under the FICSI. Following are the specific existing and emerging prominent job roles that will create employment opportunities in Tea & Coffee Processing in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.	✓	✓	✓	
Tea Taster	3	A Tea Taster is responsible for identifying different tea samples and grade various varieties of tea as per their quality.	**A Tea Taster must be able to:** • Identify different tea samples • Differentiate between various intricate tea flavours • Grade different varieties of tea **A Tea Taster must know and understand:** • Different techniques of tea tasting	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Coffee Huller Operator	4	A Coffee Huller Operator is responsible for de husking and polishing of coffee bean. The individual is also responsible for maintaining the huller.	**A Coffee Huller Operator must be able to:** • De Husk or complete separation of the husk from the coffee beans for further processing. • Prepare the work area and machineries for processing coffee • Perform general maintenance of the machineries **A Coffee Huller Operator must know and understand:** • Use of different types of machineries used in coffee processing plants • How to perform general maintenance of the processing machineries	✓	✓	✓	
Dryer / Roaster Plant Operator	4	A Dryer / Roaster Plant Operator is responsible for processing Tea & Coffee using various methods like evaporation and drying technology.	**A Dryer / Roaster Plant Operator must be able to:** • Roasting of Chicory Cubes, Spray Drying, Continuous extraction of Tea and process using evaporation and drying technology. • Perform general maintenance of the machineries **A Dryer / Roaster Plant Operator must know and understand:** • Use of different types of machineries used in Tea & coffee processing plants • How to perform general maintenance of the processing machineries	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Dosing, Filling, Weighing and Sealing Machine Operator	4	A Dosing, Filling, Weighing and Sealing Machine Operator is responsible for operating the relevant packaging machineries.	**A Dosing, Filling, Weighing and Sealing Machine Operator must be able to:** • Select the packaging material and method according to the type of tea / coffee to be packed • Prepare and operate the packaging machines • Label the packaged food products with the required information • Carry out general maintenance of the packaging equipment **A Dosing, Filling, Weighing and Sealing Machine Operator must know and understand:** • Different types of material used for packaging the tea / coffee products • Various methods of packaging			✓	✓
System Administrator	4	A System Administrator is responsible for recording and maintaining data in Management Information System (MIS) used by the organisation.	**A System Administrator must be able to:** • Install and configure the appropriate MIS software • Record data in application like FoxPro etc. **A System Administrator must know and understand:** • Use of the relevant MIS system • Process of recording and analysing data			✓	✓
Tea & Coffee Processing Plant Supervisor	5	A Tea & Coffee Processing Supervisor is responsible for monitoring the daily	**A Tea & Coffee Processing Supervisor must be able to:** • Assign tasks to the processing unit workers	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		operations of the tea/ coffee processing plant and ensuring work is carried out in an effective and timely manner by allocating tasks to workers.	• Supervise the tea and coffee processing operations • Monitor and check equipment and system for the correct functioning • Supervise the repair and maintenance activities • Manage and lead a team **A Tea & Coffee Processing Supervisor must know and understand:** • Tea and Coffee processing • Applicable food hygiene and safety standards				
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:**			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Applicable food safety and hygiene standards. • Record research or operational data				
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.	✓	✓	✓	✓
Spray Dryer Operator	4	A Spray Dryer Operator is responsible for setting up a spray drying machine for use and using it as per the applicable SOPs. The individual is responsible for carrying out regular repair and maintenance of the spray drying machine.	**A Spray Dryer Operator must be able to:** • Load raw materials into the spray dryer machine and set it up for use • Monitor the batch and use the relevant tools and equipment to measure and maintain the required temperature and humidity • Maintain the spray drying machine in working and sanitary condition by		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			carrying out regular repair and maintenance • Review process data, respond to control alarms and follow the applicable Standard Operating Procedures (SOPs) • Carry out documentation as per the organisational policy • Follow the applicable food hygiene, and health and safety standards **A Spray Dryer Operator must know and understand:** • How to prepare and use a spray dryer machine • Use of the relevant tools and equipment to measure and maintain the required temperature and humidity during spray drying Applicable documentation requirements • Applicable food hygiene, and health and safety standards				
Freeze Dryer Operator	4	A Freeze Dryer Operator is responsible for setting up freeze dryer for use; operating it; carrying out relevant procedures for freeze drying, such as pre-treatment of the product; freezing and annealing; and primary and secondary drying. The individual is also responsible for	**A Freeze Dryer Operator must be able to:** • Prepare and use the freeze dryer Carry out the freeze-drying operations such as product pre-treatment, freezing, annealing, primary and secondary processing Carry out regular repair and maintenance of freeze dryer • Follow the applicable food hygiene, and health and safety standards		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		carrying out regular repair and maintenance freeze dryer.	**A Freeze Dryer Operator must know and understand:** • Applicable food hygiene, and health and safety standards • How to carry out various relevant processes during freeze drying How to set up, use and maintain freeze dryer				

Table 112: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

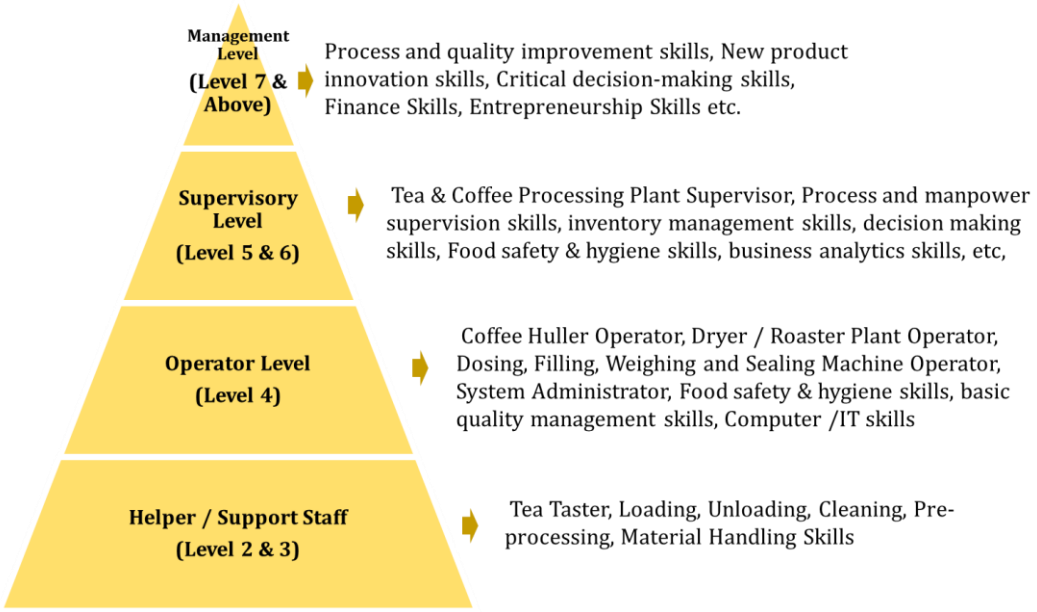


Figure 132: Skill Sets required across multiple levels in the sector

12.8 Expectations from the Industry stakeholders

Large-scale tea and coffee plantations and processors have started relying on unskilled migrant workers due to unavailability of local workforce for processing.

The medium; small and micro tea and coffee processors currently work on a low level of mechanization and have opportunities to have better machines that save time. This in turn doesn't impact or reduce manpower, but increases productivity.

Visibility of Training Institutes offering technicians

- There are very limited institutes, that the companies are aware of, for the training related to Tea / Coffee Processing. With the limited availability of the institutes, it is expected that more institutes to be operated across the Southern region, East & North East (Tea & Coffee Processing clusters)
- Introduction of more online training programs to make skilling available at a national level

Sector Specific Job Roles

- There are no QPs developed by the FICSI for tea / coffee processing. With the growth in the sector, there is a scope for introducing specific job roles like Tea Taster, etc.
- Tea Tasting is an important component of tea manufacturing and only few institutes across the country offer a course on that. A relevant QP/NOS can be developed for this since a considerable number of tea tasters are required in Tea clusters.
- System admins job is also a demand for Tea or coffee garden office where the data processing in application like FoxPro and other tools. Very limited manpower availability knowing these computer tool skills for Tea / coffee processing.

Chapter 13: Sub-Sectoral Analysis – RTE & RTC Products

13.1 Market summary

Ready-to-eat / Ready-to-cook (RTE / RTC) food products, as the name suggests refer to that form of animal or plant-derived food or a combination thereof that can be offered to the customer after being pre-washed, pre-cooked, processed, frozen and hence does not require elaborate processing of the food by the end-consumer before consumption; thus, saving time and energy of the consumers. This product segment has emerged as an alternative to a complete home-cooked meal. Growing urbanization, rising income, increasing number of employed women with children, single parent working and a busy lifestyle has powered the RTE/RTC market in the country. Currently, RTE/RTC foods, also synonymously called ready meals, packed foods or instant ready meals in some places, is the largest segment globally in the overall conventional and non-conventional food industry owing to higher consumer acceptance of such foods. Hectic lifestyle, need for faster cooking, growing population of working women, changing food habits etc. have created latent demand for RTE/RTC products in India. This rise in demand has created interest among many companies to enter this space of ready foods. Factors like Innovative products, packaging and longer shelf life, aggressive marketing and promotion strategies will lead to strong growth of this segment in the coming years. Besides, retailers are offering lucrative options such as combo packs, day-specific discounts, festive offers, flat discounts and coupon discounts etc. improve the sales of RTE/RTC products. Govt. has recently announced PLI scheme to incentivize eligible players in Food Processing segments including RTE/RTC companies. The sector will record the highest growth rates across all the food processing segments and presents a lot of investment and growth opportunities for companies.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	135
No. of registered units	716
Past Growth rate (CAGR) (FY' 15 – FY' 20)	15%
Total Number of Employees (FY' 20)	51,085 nos.
Overall Exports (FY'20)	INR 5,775 Crs.
Expected Market ('000 MT) FY' 2030	459
Future growth rate (FY' 20 – FY' 30)	13%
Total Employee Estimation (FY' 30)	1,59,785 nos.
Overall Employment Additions (FY' 20 – FY' 30)	1,08,700 nos.

Table 113: RTE & RTC Products: Key Industry Indicators

13.2 Present State of the Industry & Future Outlook

Ready-to-eat / Ready-to-cook (RTE / RTC) food products, as the name suggests refer to that form of animal or plant-derived food or a combination thereof that can be offered to the customer after being pre-washed, pre-cooked, processed, frozen and hence does not require elaborate processing of the food by the end-consumer before consumption; thus, saving time and energy of the consumers.

This product segment has emerged as an alternative to a complete home-cooked meal. Growing urbanization, rising income, increasing number of employed women with children, single parent working and a busy lifestyle has powered the RTE/RTC market in the country.

Currently, RTE/RTC foods, also synonymously called ready meals, packed foods or instant ready meals in some places, is the largest segment globally in the overall conventional and non-conventional food industry owing to higher consumer acceptance of such foods.

The RTE/RTC foods can be further classified as below.

Ready-to-eat breakfast cereals	Shelf stable ready meals	Shelf stable fruits and vegetables	Processed frozen fruits and vegetables	Frozen ready meals
These are plain or mixed cereal flakes, puffed grains, fruit or flake mixtures with or without other ingredients	These are packaged full meals items that can be stored at room temperature without any chance of contamination	These are packaged fruits and vegetables, with little or no other ingredients, that can be stored in room temperature	These are frozen fruits and vegetables, with added ingredients and preservatives, so that shelf life of food can be increased	These are pre-packaged, frozen meal that requires heating before consumption
Examples: Kellogg's Corn Flakes, Kellogg's Chocos, and Bagrrys Corn Flakes	Examples: MOM Meal of the Moment Pouch, Mini Cup Idli, and MOM Veg. Biryani Pouch	Examples: Fruit spreads, dried berries, broccoli, cauliflower, corn, green beans and peas, dehydrated potatoes	Examples: Fruit juice, chopped vegetables, and vegetable pastes	Examples: Haldiram's ready-to-eat food pouches, Miraj's ready-to-eat food pouches, chicken tikka pouches

Table 114: RTE/RTC foods: Classification

Manufacturing Clusters:

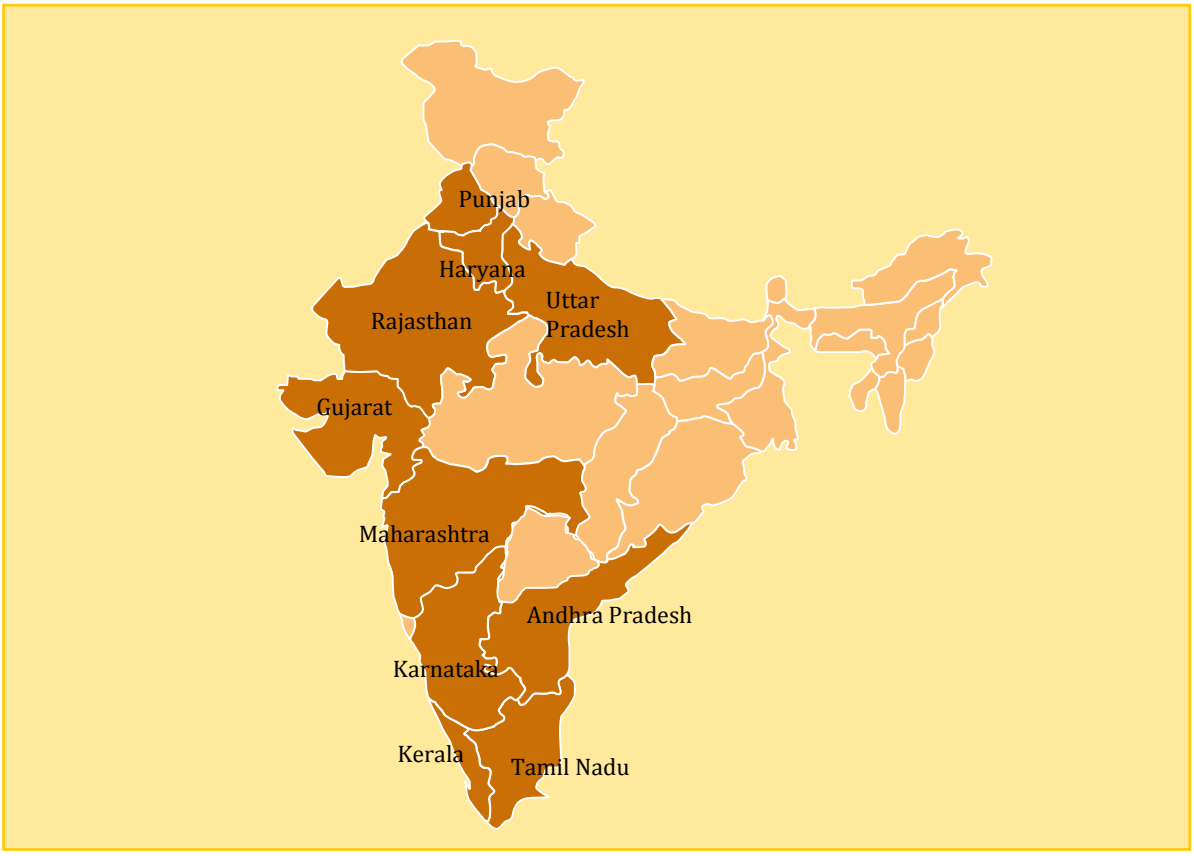


Figure 133: Manufacturing Clusters

Top 10 states account to 82% of total employment in the RTE & RTC Products industry

Market Overview

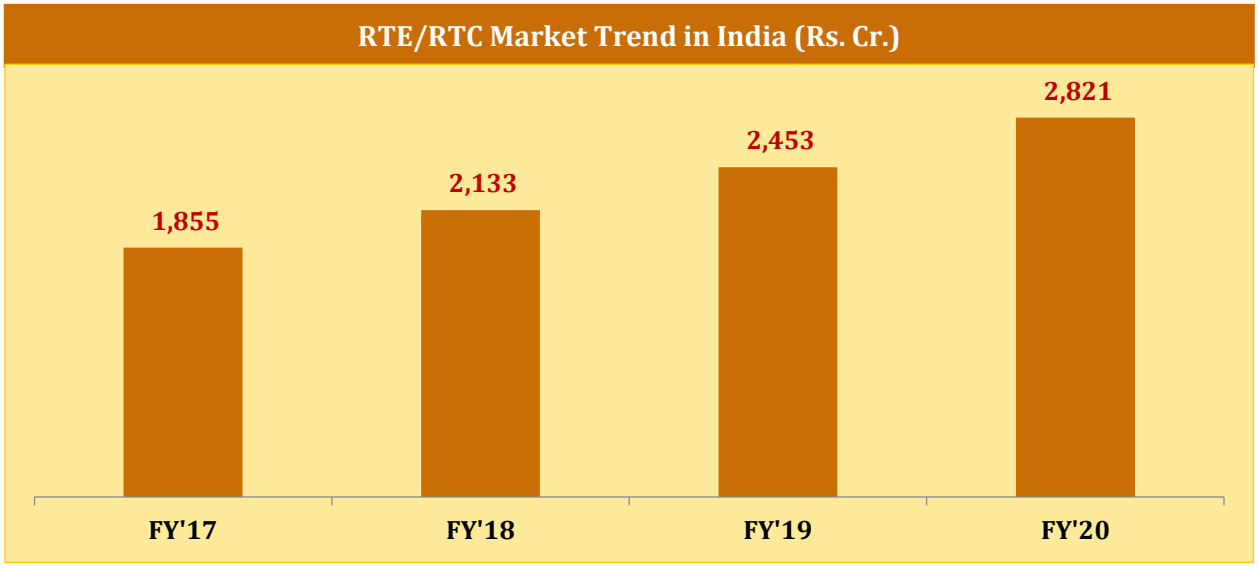


Figure 134: RTE/RTC Market Trends in India (Rs. Cr.)

Source: Global News Wire, FnBnews, Subject matter expert

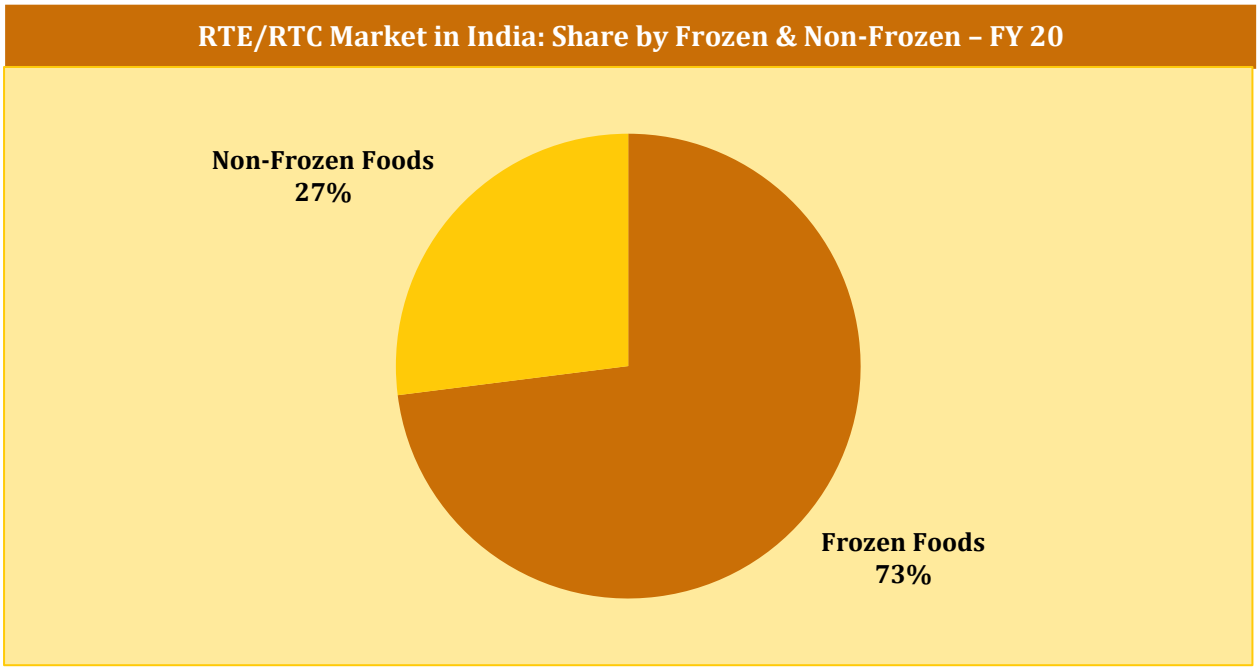


Figure 135: RTE/RTC Market in India: Share by Frozen & Non-Frozen – FY 20

Source: Global News Wire, FnBnews, Subject matter expert

Major brands by key product segment

Non-Frozen RTC	Curries / Meals	Asal, MTR, Kitchens of India, Mother's Recipe
	Batters and Pastes	iD, Asal, MTR
	Instant Pasta	Maggi, Sunfeast, Bambino, Knorr
	Desserts	Gits, Kitchens of India, MTR, Weikfield, Pillsbury
Frozen RTC	Snacks (Fries / Nuggets / Tikkis)	McCain, Venky's, Sumeru, Yummiez, Al Kabeer
	Meat Snacks (Chicken / Mutton / Prawn / Fish	Al Kabeer, Venky's, Cambay Tiger, Buffet, Yummiez

Figure 136: Major brands by key product segment

13.3 Present Employment Scenario & Analysis

Category of the Companies by Revenue

Most of the Large and Medium Enterprises are into manufacturing of multiple food products apart from RTE/RTC products. Average no. of employees indicated in the tables are the employees working only in the RTE/RTC manufacturing line. LMS classification has been made based on overall revenue of the companies. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

13.3.1 Sample Coverage by Categories of Companies & Region

Category of the Company	Sample Coverage (N)	East	North	West	South
Micro Enterprises	427	23%	24%	28%	25%
Small Enterprises	278	22%	24%	28%	26%
Medium Enterprises	30	20%	25%	32%	23%
Large Enterprises	5	22%	24%	28%	26%
Total	740	22%	24%	28%	25%

Table 115: Sample Coverage by Categories of Companies & Region

13.3.2 Total No. of Employees

Past Trend of employment in the RTE & RTC Industry

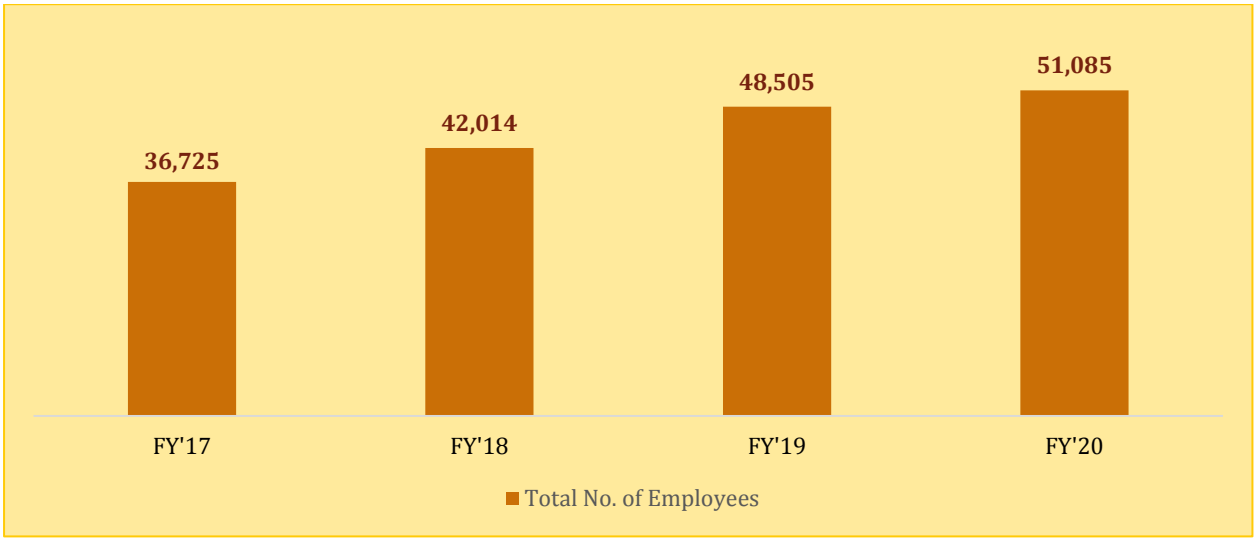


Figure 137: Past Trend of employment in the RTE & RTC Industry

Source: Feedback Analysis

Share of Employees (FY' 20) Break by Different Category

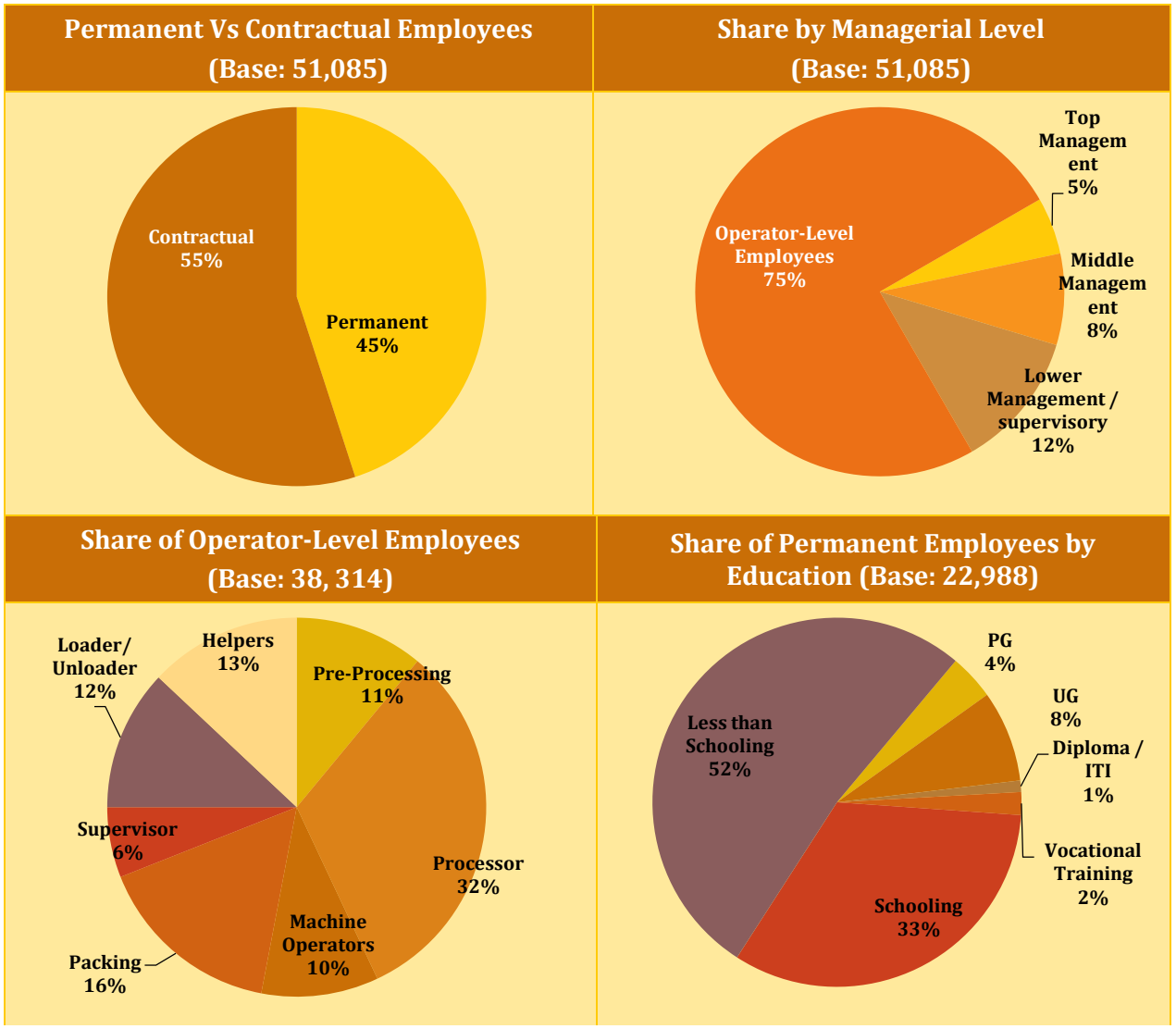


Figure 138: Share of Employees (FY'20): By Different Category

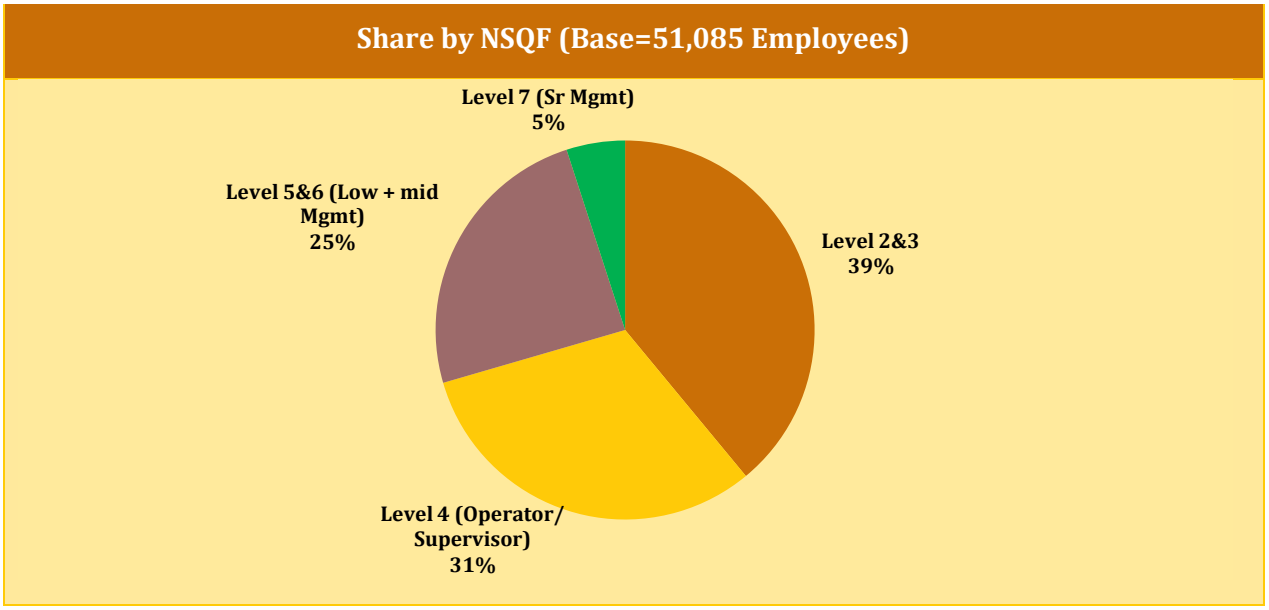


Figure 139: Share of Employees (FY'20): By NSQF levels

Source: Feedback Analysis

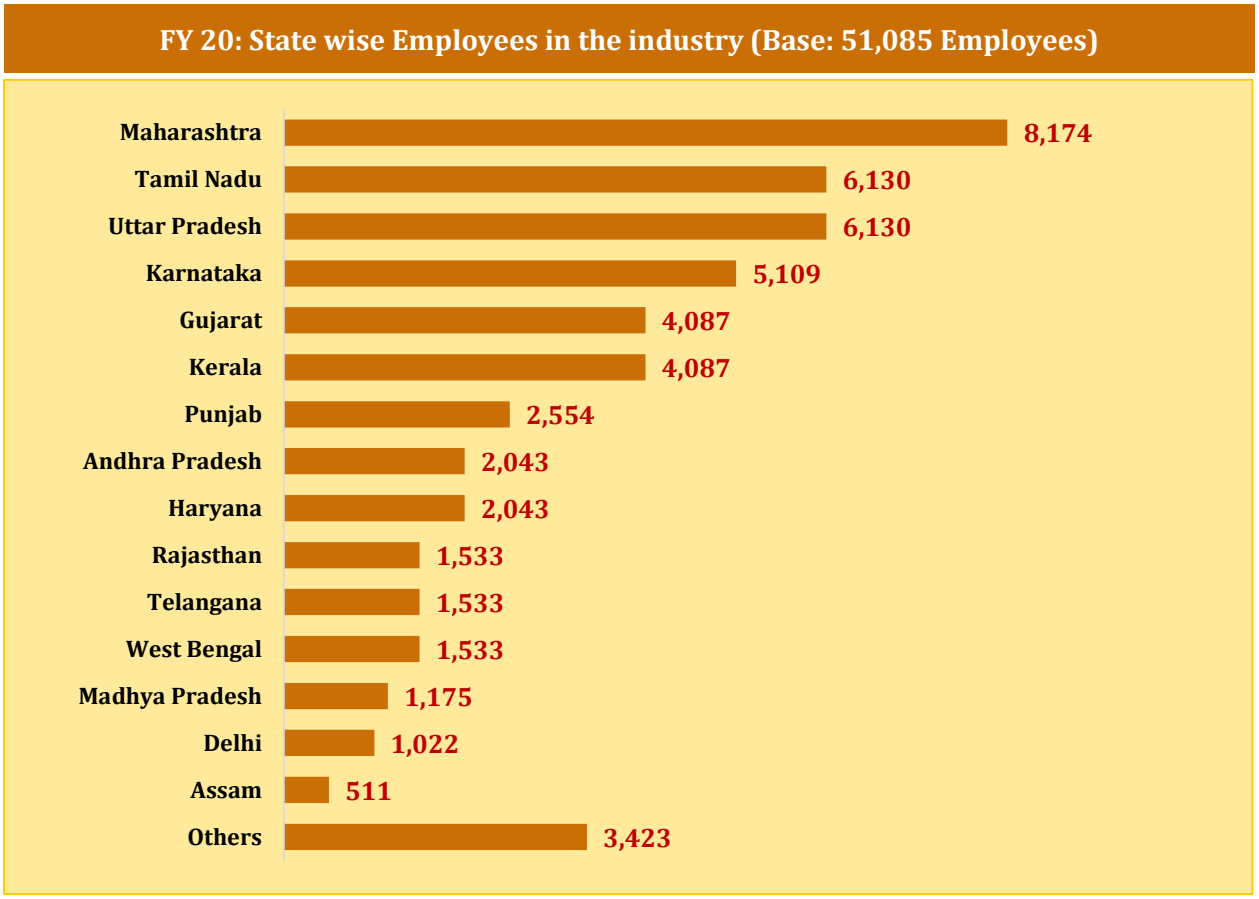


Figure 140: State wise Employees in the Industry (FY'20)

Source: Feedback Analysis

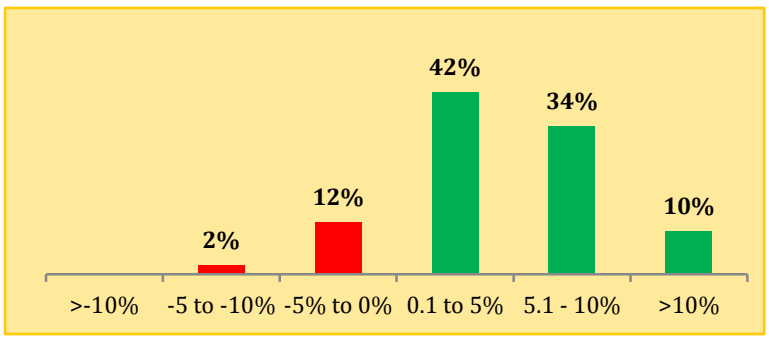
Top 15 states account to 93% of total employment in the industry

Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Pre-Processing Labours	The pre-processing work includes primarily grinding; Cutting; grading and sorting the raw materials and other ingredients, etc.	3	✓	✓	✓	✓
2	Supervisors (Quality of Raw Materials)	Selection of raw materials for quality production, quality evaluation of ingredients involved in making products with reference to grades & classification	5	✓	✓	✓	✓
3	Processing employees	Mixing, Cooking and other processing types with standard operating procedures followed.	4			✓	✓
4	Machine Operators	Practice to operate machines with changing parameters, sensory analysis of final product.	4	✓	✓	✓	✓
5	Packers	Identification of packaging materials, practice on packaging with sealing and sending it for storing and marketing.	3	✓	✓	✓	✓
6	Shift Supervisor	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
7	Helpers	Misc. work including Cleaning plants, Machinery after every batch, etc.	3	✓	✓		
8	Loader / Unloader	Material handling, Loading & Unloading products.	3	✓	✓	✓	✓

Table 116: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

13.3.3 Past Growth of Employees (FY'17 – FY'20)



- **<15%** of the small enterprises have indicated that their manpower has **de-grown** in the past 3 years
- 42% have indicated that their manpower has grown marginally

Figure 141: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

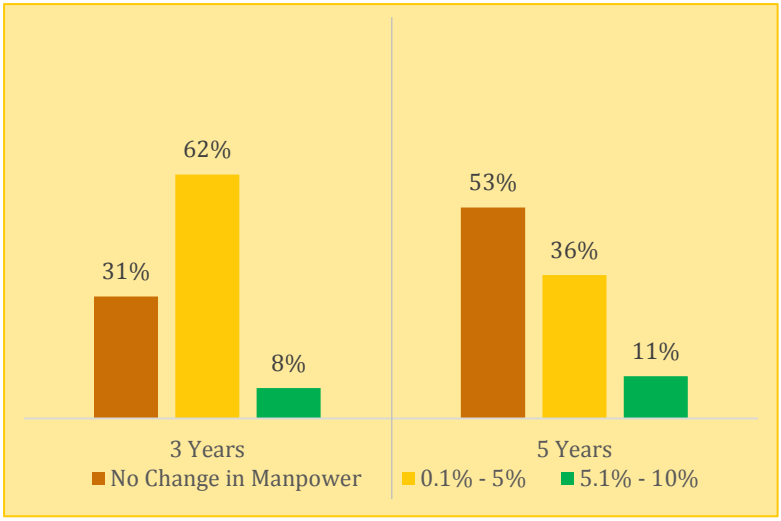
13.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Plan to invest on technology	29%	61%	29%	100%
Plan to invest on new equipment	23%	47%	29%	100%
Plan to enhance the production capacity	36%	59%	34%	100%
Plans to launch new products	38%	35%	32%	100%
Plans to increase exports	23%	2%	21%	71%
Plans to invest on R&D	5%	7%	9%	86%

Table 117: Future Plans of the Companies

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- ~2% in next 3 & 5 years

Figure 142: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

Source: Feedback Analysis

13.4 Recruitment & Training Practice

Recruitment Practice

Walk-ins are the key source of recruiting candidates across Operational and Lower-level employees. Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal training institutes offering Food Tech / Food Science programs
Middle Management	• Formal training institutes offering Food Tech / Food Science programs

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Lower Level Management	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 118: Recruitment Practice

Training Practice

Overall, 20 – 25% of the companies covered during the survey, were providing training to new employees, across levels (On-the-Job training).

% of Companies offering training

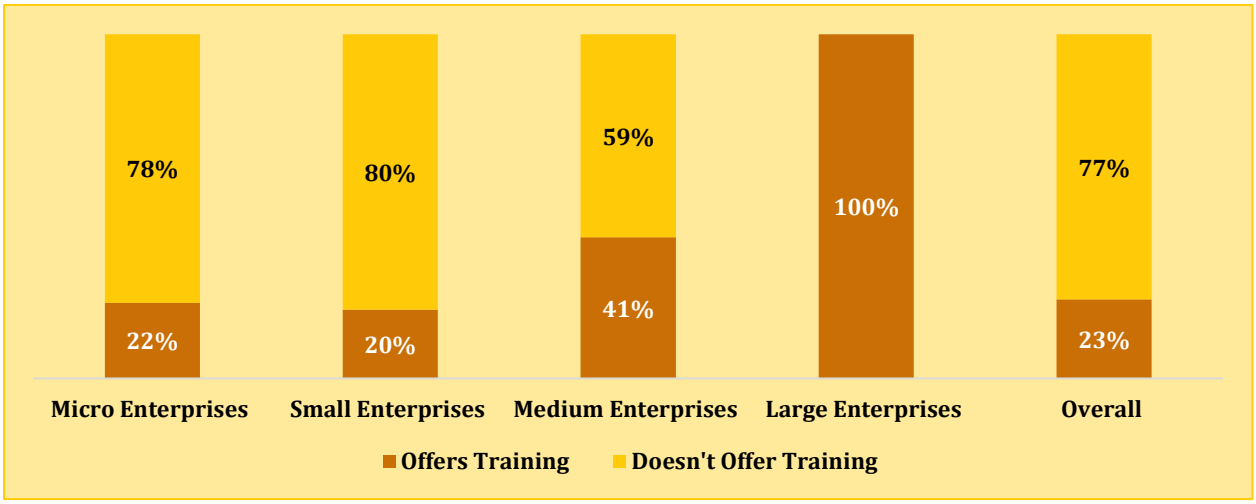


Figure 143: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered (Encountered in Primary Interviews)

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Processing Operations	Selection of raw materials and ingredients	Operator level employees	✓	✓	✓	✓
Pre-Processing Operations	Slicing; grading; preparation for processing, etc.	Operator level employees; Lower-level employees; Supervisors	✓	✓	✓	✓
Processors	Product preparation methods	Operator Level Employees &	✓	✓	✓	✓

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
		Lower-Level Employees				
Machine Operations	Training to operate the machines and maintenance	Operator Level Employees & Lower-Level Employees	✓	✓	✓	✓
Operations Management	Overall operations	Supervisors / Managers			✓	✓
Packing	Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio	Operator Level Employees; Lower-Level Employees; Supervisors				✓

Table 119: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

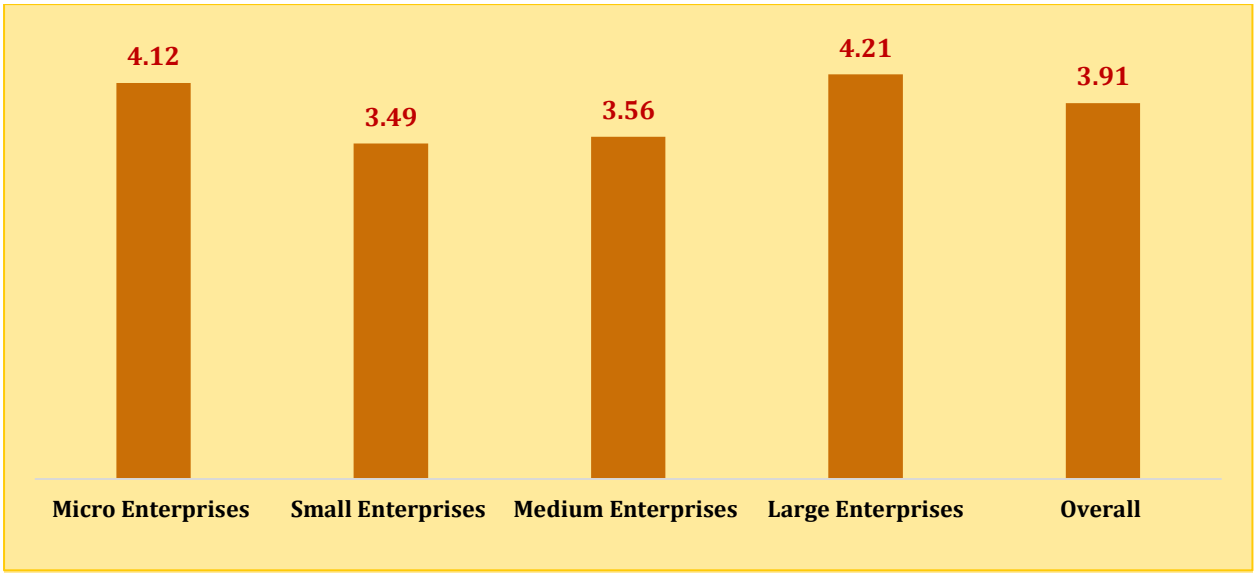


Figure 144: Effectiveness of Training

Source: Feedback Analysis

13.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

Limited Skilled / Semi Skilled employees available

- Skilled workers in this industry are very limited. The skilled employees demand is increasing across all functions in the manufacturing line starting from Pre-processing function
- Higher dependency on women employment on specific functions and at the same time higher attrition among employees

Poor Knowledge on Sourcing Trained Labour

- Small and Micro units depend on walk-ins or known contacts for unskilled or semi-skilled labours.
- The primary reason for the same is limited awareness of the training institutes in the vicinity, that offers programs on RTC/RTE Processing

Skill gaps by specific Job roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Plant Manager / Production Manager	Mid Management NSQF: 6	• Equipment operations (across functions) • Technical Know-how across functions • Training manpower at the lower level or operator level • Production planning	Understanding and adaptation to newer technologies Lack of knowledge on equipment maintenance and operations	✓	✓	✓	✓
Quality Control	Mid Management NSQF: 5	• Monitoring the Raw materials quality • Ingredient's quality check • Assessing the quality for the finished products	• Unable to maintain the similar quality across batches • Poor selection of raw materials / ingredients			✓	✓

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
R&D Executives	Mid Management NSQF: 5	• Exploring new products in RTE/RTC • Understanding Consumer changing behavior	• Limited frequency of new product development				✓
Shift Supervisor / Supervisor	Lower-Level Management NSQF: 5	• Overseeing operations including material handling across functions • Equipment operations and maintenance	• Best practices w.r.t material handling to reduce wastage during material handling	✓	✓	✓	✓
Maintenance Officer	Lower-Level Management NSQF: 4	• Knowledge on latest equipment and the old equipment (primarily for maintenance)	• Not updated to understand new technology evolution	✓	✓	✓	
Loading / Unloading Labors	Operator Level Employees NSQF: 3	• Materials Handling	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	✓
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygiene awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓		

Table 120: Key job roles and their required skills and skill gaps

13.6 Future Projection – Sector & Employment

Projected growth in RTE / RTC industry in India

Based on discussions conducted with the Visionaries and Industry experts, RTE/RTC foods production likely to reach approx. Rs. 9,600 Cr. or approx. 4.6 Lac MT by FY'30. This indicates CAGR of approx. 13%.

Reasons for such growth are the followings:

- Hectic lifestyle, need for faster cooking, growing population of working women, changing food habits etc. have created latent demand for RTE/RTC products in India
- This rise in demand has created interest among many companies to enter this space of ready foods. Factors like Innovative products, packaging and longer shelf life, aggressive marketing and promotion strategies will lead to strong growth of this segment in the coming years
- Besides, retailers are offering lucrative options such as combo packs, day-specific discounts, festive offers, flat discounts and coupon discounts etc. improve the sales of RTE/RTC products

Year	Market Size (Rs. Cr.)	Market Size ('000 MT)	Y-o-Y Growth
FY'20	2,821	135	
FY'21 (E)	3,250	156	15.2%
FY'22 (E)	3,750	179	15.4%
FY'23 (E)	4,250	203	13.3%
FY'24 (E)	4,800	230	12.9%
FY'25 (E)	5,400	258	12.5%
FY'26 (E)	6,100	292	13.0%
FY'27 (E)	6,900	330	13.1%
FY'28 (E)	7,700	368	11.6%
FY'29 (E)	8,600	411	11.7%
FY'30 (E)	9,600	459	11.6%

Table 121: Future Market & Growth Rate of RTE / RTC products

Source: FnBnews, Subject Matter Expert & Visionaries

Processing capacity and investment required in RTE / RTC industry

Parameter	Unit	Values
FY'20 Production	'000 MT	135
FY'30 Production (E)	'000 MT	459
Increase in production between FY'20 & FY'30	'000 MT	324
Considering 80% capacity utilization, additional processing capacity required	'000 MT	405
Investment norm	Rs. / MT	3,00,000
Total Investment required	**Rs. Cr.**	**12,163**

Table 122: Processing capacity and investment required in the sector

Source: Discussion with Plant & Equipment Manufacturers & SMEs

Select ongoing and upcoming projects in RTE / RTC industry

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Nestle India Ltd.	Sanand Maggi Noodles & Confectionery Plant Project	Sanand, Gujarat	New Unit	700
2	Nestle India Ltd.	Nanjangud Instant Noodles, Mixed Condiments & Seasonings Factory Project	Nanjangud, Mysore	New Unit	360
3	Deepkiran Foods Pvt. Ltd.	Sanand Frozen Processed Food Project	Sanand, Gujarat	New Unit	150
4	Indo Nissin Foods Pvt. Ltd.	Khurda Noodles Manufacturing Unit Project	Khordha, Odisha	New Unit	100
5	I T C Ltd.	Barasat Yipee Noodles Plant Project	Barasat, West Bengal	New Unit	65
6	Indo Nissin Foods Pvt. Ltd.	Khordha Noodles Manufacturing Unit Expansion Project	Odisha, Odisha	Expansion	50
7	Merino Industries Ltd.	Dahej Ready-to-Cook (Vegit) Manufacturing Plant Project	Dahej, Gujarat	New Unit	50
8	Golden Fries Ltd.	French Fries Project	Karamadai, Tamil Nadu	New Unit	39

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
9	C G Foods India Pvt. Ltd.	Rudrapur Instant Noodles Plant Project	Rudrapur, Uttarakhand	New Unit	35
10	C G Foods India Pvt. Ltd.	Purnea Instant Noodles Plant Project	Purnea, Bijar	New Unit	30

Table 123: *Select ongoing and upcoming projects in RTE / RTC industry*

Source: CMIE & Projects Today

FY'20 employment estimation in RTE/RTC industry

Company Category	Average no. of Employees	FY'20 Total No. of Employees in RTE/RTC Industry	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	525	5,250	15%	20	3.9
Medium Enterprises	300	16,500	35%	47	2.9
Small Enterprises	85	21,335	40%	54	2.5
Micro Enterprises	20	8,000	10%	13	1.7
Total		**51,085**		**135**	**2.6**

Table 124: *FY'20 employment estimation in RTE/RTC industry in India*

**Discussion with the RTE/RTC Manufacturers and SMEs*

Note: Most of the Large and Medium Enterprises are into manufacturing of multiple food products apart from RTE/RTC products. Average no. of employees indicated in the above tables are the employees working only in the RTE/RTC manufacturing line. LMS classification has been made based on overall revenue of the companies. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection in RTE / RTC industry in India

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	12%	55	4.2	12,993	7,743
Medium Enterprises	33%	152	3.0	50,421	33,921
Small Enterprises	40%	184	2.7	69,147	47,812
Micro Enterprises	10%	46	1.7	27,224	19,224
Total		**436**	**2.7**	**159,785**	**108,700**

Table 125: *Future employment projection in RTE / RTC industry in India*

As per discussion with the RTE/RTC Manufacturers and SMEs, there could be marginal increase in the share for large and medium enterprises in future. The same has been considered for computing future employment generation potential

 # Based on discussions with equipment manufacturers and SMEs, large and some of the medium and small enterprises will adopt automation/ industry 4.0 in the coming years. As per equipment manufacturers, this may lead to 10% improve in the productivity for large enterprises and average 5% improvement in the productivity for the medium and small enterprises. It is estimated that micro enterprises likely to have current productivity level in future as well. The same has been considered for calculating future employment generation potential.

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category

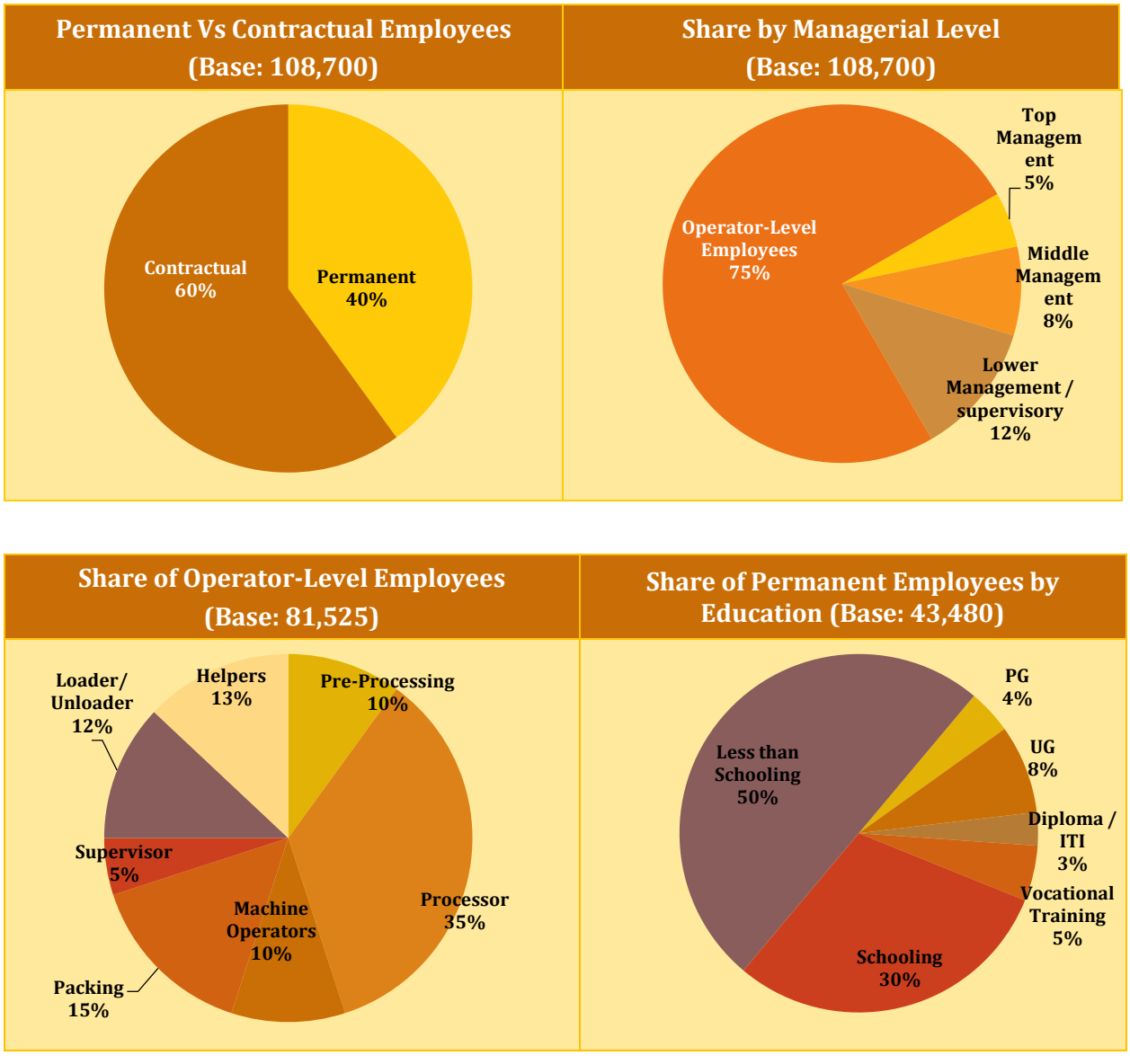


Figure 145: Share of FY'20 - FY'30 Employment Generation potential: By Different Category

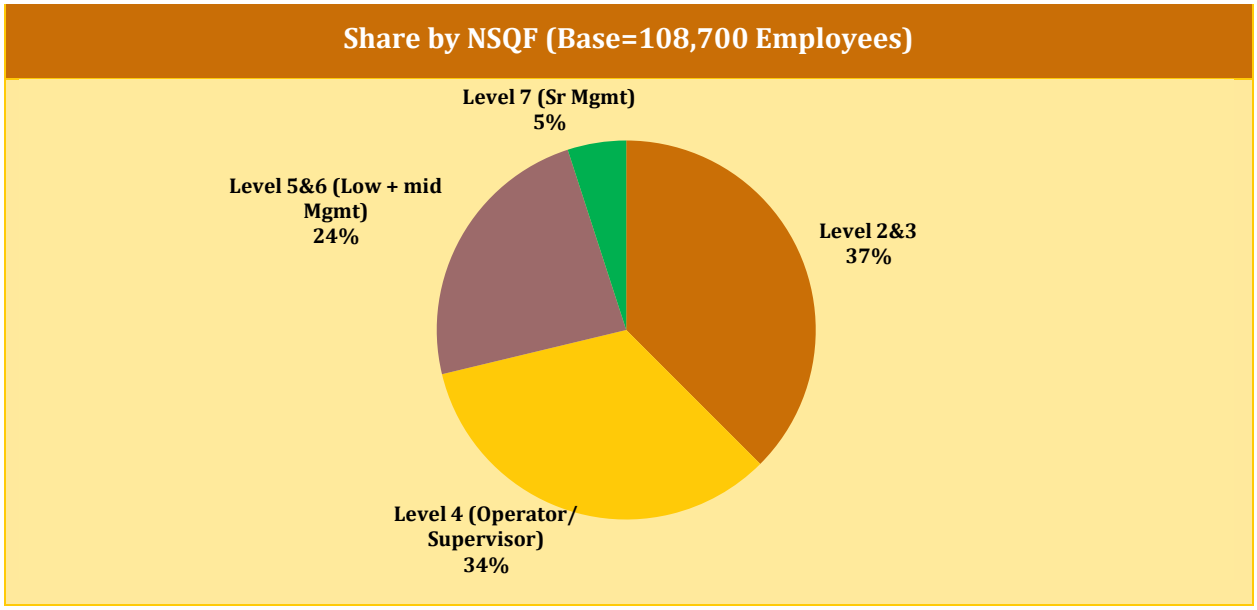


Figure 146: Share of FY'20 - FY'30 Employment Generation potential :By NSQF levels

Source: Feedback Analysis

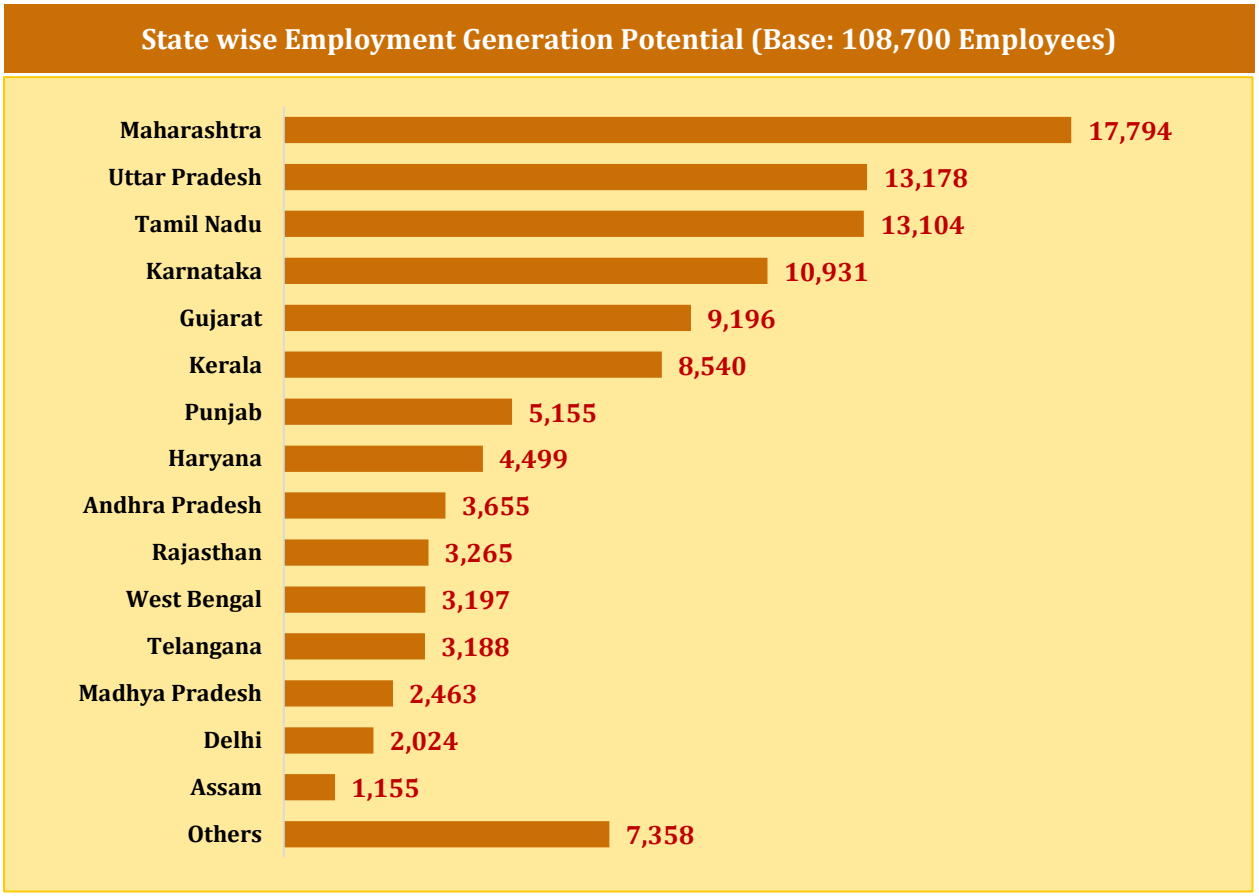


Figure 147: State wise Employment Generation Potential

Source: Feedback Analysis

Top 15 states account to 93% of total employment in the industry

13.7 Existing & emerging prominent Job roles which requires skilling

There are few notable programs developed by the sector skill council for RTE/RTC sector. Skills like Convenience food maker and Traditional snack & Savory maker for the production function and Packing technician for packing function are well aware among the manufacturer fraternity.

Following are the specific existing and emerging prominent job roles that will create employment opportunities in RTE/RTC products Sub-sector in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/ unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.	✓	✓	✓	
Ingredient Preparator	3	An Ingredient Preparator is responsible for selecting and preparing the ingredients for the processing of Ready to Eat (RTE) and Ready to Cook (RTC) products.	**An Ingredient Preparator must be able to:** • Select the appropriate raw materials required for production of RTE and RTC products • Carry out cleaning, grading, peeling, as per the supervisor's instructions **An Ingredient Preparator must know and understand:**			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Different industrially important RTE and RTC products • Various ingredients used for making RTE & RTC products • Applicable food hygiene and safety standards				
Freeze Drying Machine Operator	4	A Freeze-Drying Machine Operator is responsible for fruit dehydration by freeze drying technique and operating relevant equipment.	**A Freeze-Drying Machine Operator must be able to:** • Prepare the relevant freeze-drying machines for various processes based on requirement. • Operate the machineries appropriately **A Freeze-Drying Machine Operator must know and understand:** • Various machineries used for preparation of RTE and RTC products • Process of operating various machineries for the production of RTE and RTC products		✓	✓	✓
Pick-Fill-Seal Machine Operator	4	A Pick-Fill-Seal Machine Operator is responsible for preparing and operating the packaging equipment to pack the Ready to Eat (RTE) and Ready to Cook (RTC) products. The individual also labels them.	**A Pick-Fill-Seal Machine Operator must be able to:** • Prepare and operate the packaging equipment • Carry out maintenance of the packaging equipment • Label the packaged RTE and RTC products **A Pick-Fill-Seal Machine Operator must know and understand:** • Criteria for the selection of appropriate packaging material for RTE and RTC products		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Various methods and techniques of packaging processed food products • Process of operating relevant packaging equipment • How to perform general maintenance of the packaging equipment				
RTE/RTC Plant Supervisor	5	An RTE/RTC Plant Supervisor is responsible for scheduling and allocating tasks to the workers, monitoring the performance of the workers, ensuring correct functioning of the machineries and overall maintenance of the plant.	**An RTE/RTC Plant Supervisor must be able to:** • Schedule activities and allocate task • Maintain general safety and discipline • Measure qualities of finished products **An RTE/RTC Plant Supervisor must know and understand:** • Knowledge of all relevant safety and security procedures • Product quality evaluation criteria w.r.t national and international standards	✓	✓	✓	✓
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables.			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		finished products.	• Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data				
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Supplier management. • Safety audit procedures.				
Food Extruder Machine Operator	4	A Food Extruder Machine Operator is responsible for setting up, testing, and calibrating a food extruder machine for extruding relevant food products. The individual maintains the recommended pressure, speed, and temperature during extruding operation, uses the relevant cutters, moulds, and other equipment as per the requirement; and also carries out regular repair and maintenance of food extruder machine.	**A Food Extruder Machine Operator must be able to:** Set up, test and calibrate the food extruder machine for use Monitor and maintain the recommended pressure, speed and temperature during the extrusion process Select and install cutters, moulds and other necessary equipment parts as per the requirement to achieve machine efficiency Check and maintain the quality of extruded food products to ensure adherence to the applicable quality standards Carry out regular repair and maintenance of food extruder machine Follow the applicable food hygiene, and health and safety standards **A Food Extruder Machine Operator must know and understand:** Applicable food hygiene, and health and safety standards How to set up, test and calibrate the food extruder machine How to extrude relevant food products using the food extruder machine How to carry out regular repair and maintenance of food extruder machine	✓	✓	✓	✓

Table 126: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

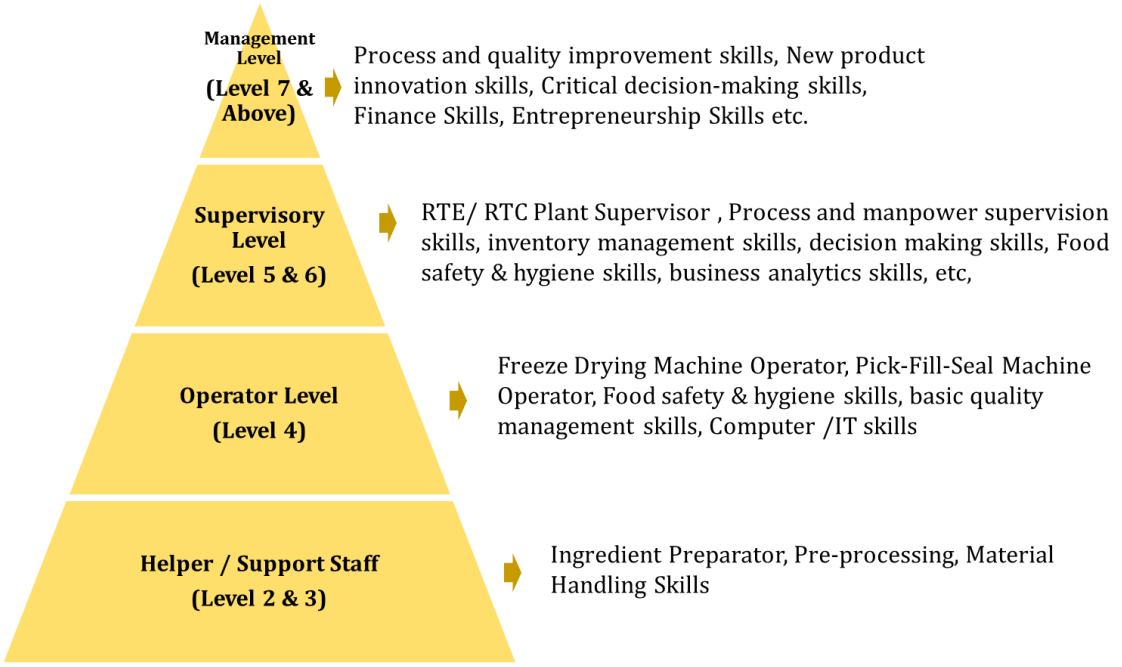


Figure 148: Skill Sets required across multiple levels in the sector

13.8 Expectations from the Industry stakeholders

With the progress and growth in the industry, companies scaling up will need skilled workforce at the entry and multiple levels

There are few categories where there is a potential in upskilling people

- R&D skills
- Technology and Project Management
- Quality and food safety
- Legal and statutory
- Manufacturing Gaps: Gap is at the entry level. Very few people can operate the food processing equipment.

Practical Training – Mandatory for both formal & In-formal Training

- A program to make students / probable recruits' industry ready before absorbing them into the organization.
- Program to work very closely with industries. Every industry needs to develop its own plans to work with academic institutes.
- Curriculum to include the regulatory requirements as well. This will add value to the recruiting organization.

Need for Basic Operator Training specifically for RTE / RTC industry

- More requirements are coming up in the Electropneumatic and Mechatronic technologies, which is required for automation. There is a huge skill gap in the current work force

- The new technology-based job roles which need to be looked at are - freezing systems, IQF, spiral freezers, packaging systems, chilling and cooling related like freon, retort packaging, MATS etc.
- Need for basic ITI operators trained in the operating and basic maintenance of the above equipment

Higher Emphasis on 'Food Safety' & Hygiene Related Programs

- 'Food Safety' should be the first and foremost subject, to be trained for any person getting employed in the RTE / RTC sector
- Prospective workers also need to be trained on how to handle products and the steps involved in food processing
- It becomes extremely important to sensitize employees on the importance of maintaining stringent hygiene standards. This is one area where the government needs to lay a lot of emphasis on across food processing sectors.

Data Analytics – New jobs on Demand

- RTE / RTC sector deals with a lot of data starting from raw material procurement from different parts of India and imports to retail sales of the end products.
- These data have to be used for the benefit of the company in terms of demand forecasting, raw materials supply forecasting, productivity monitoring and optimize the machine running time, predictive assessment of market, etc…
- Industry would need these skills going forward for their self-growth as well as industry growth

Government of India should fund prospective companies to implement Industry 4.0 solutions and also provide for upskilling of employees

- RTE / RTC which essentially uses a lot of automation in the current set up and also invests in new technology
- There is a tremendous scope for increase in skilled manpower considering the developments in Indian market. The developments are in terms of technology which has increased the productivity which in turn increases the scope for increase in manpower.

Getting Basics Right

- Computer literacy and basic arithmetic skills are at times lacking in freshers / new recruits. Training on these for mid and top management employees becomes mandatory.

Chapter 14: Sub-Sectoral Analysis – Soya Processing

14.1 Market summary

India is the fifth largest producer of soybean in the world and is the fourth largest exporter of soybean to the world. The start of commercial exploitation of soybean in India is nearly four decades old. In this period, the crop has shown unparalleled growth in area and production. Soybean has established itself as a major rainy season crop in the rainfed agro-ecosystem of west and central India. Currently the rainfed potential of soybean in India is about 2.1 t/ha against the national average productivity of just 1.2 t/ha. Soybean can be used to prepare a plethora of different products that acts as a substitute for milk and milk products. Soy products also act as a substitute for meat products, and are best suited for vegan diets. The costs of these products are very low and are helpful to combat the malnutrition by the incorporation of the soy-based food products in daily diet. As increasing number of consumers seeking non-dairy beverage alternatives, this has led to substantial growth in the demand for soy milk in the country. New production technology coupled with new varieties of soybeans have resulted in introduction of new flavors which are giving tough competitions to cow milk and dairy products. Furthermore, increasing health consciousness among Indian population and various health benefits of soy milk are driving the growth of Indian Soya processing industry. The trend is likely to continue in the coming years.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	18,350
No. of registered units	165
Past Growth rate (CAGR) (FY' 15 – FY' 20)	4.8%
Total Number of Employees (FY' 20)	6,075 nos.
Overall Exports (FY'20)	INR 3,681 Crs.
Expected Market ('000 MT) FY' 2030	34,000
Future growth rate (FY' 20 – FY' 30)	6.4%
Total Employee Estimation (FY' 30)	11,256 nos.
Overall Employment Additions (FY' 20 – FY' 30)	5,181 nos.

Table 127: *Soya Processing: Key Industry Indicators*

14.2 Present State of the Industry & Future Outlook

India is the fifth largest producer[47] of soybean in the world and is the fourth largest exporter of soybean to the world. The start of commercial exploitation of soybean in India is nearly four decades old. In this period, the crop has shown unparalleled growth in area and production. Soybean has established itself as a major rainy season crop in the rainfed agro-ecosystem of west and central India.

Introduction of soybean has resulted in an enhancement in the cropping intensity and resultant increase in the profitability per unit land area. A number of varieties that have been bred have resulted in this unprecedented growth.

Currently the rainfed potential of soybean in India is about 2.1 t/ha against the national average productivity of just 1.2 t/ha. Hence, large yield gaps exist between the potential and the actual yields harvested by the farmers.

Stakeholders present in the value chain[48]

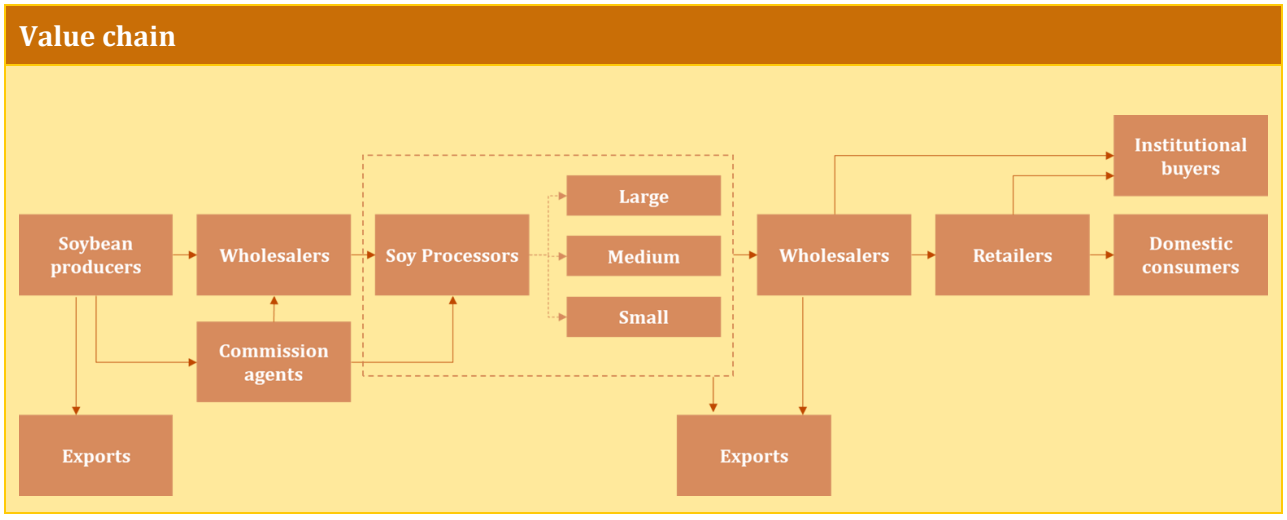


Figure 149: *Value Chain of Soya processing in India*

Soybean processing in India

The Soybean can be used to prepare a plethora of different products that acts as a substitute for milk and milk products such as cheese, flavoured milk, yoghurts and spreads among others.

Soy products also act as a substitute for meat products, and are best suited for vegan diets.

[47] http://jnkvv.org/JNKVV_RESEARCH/RESEARCH_Crop_Soyabean.aspx
[48] Source: Primary Interview with Subject matter expert and visionaries

Figure 150: *Soybean processing: Soybeans to Soy Products*

Soybeans are rich in protein content and provide amino acids that are essential for the body. Soy contains two types of fatty acids namely omega-3 and omega-6 fatty acids.

The costs of these products are very low and are helpful to combat the malnutrition by the incorporation of the soy-based food products in daily diet.

Manufacturing Clusters:

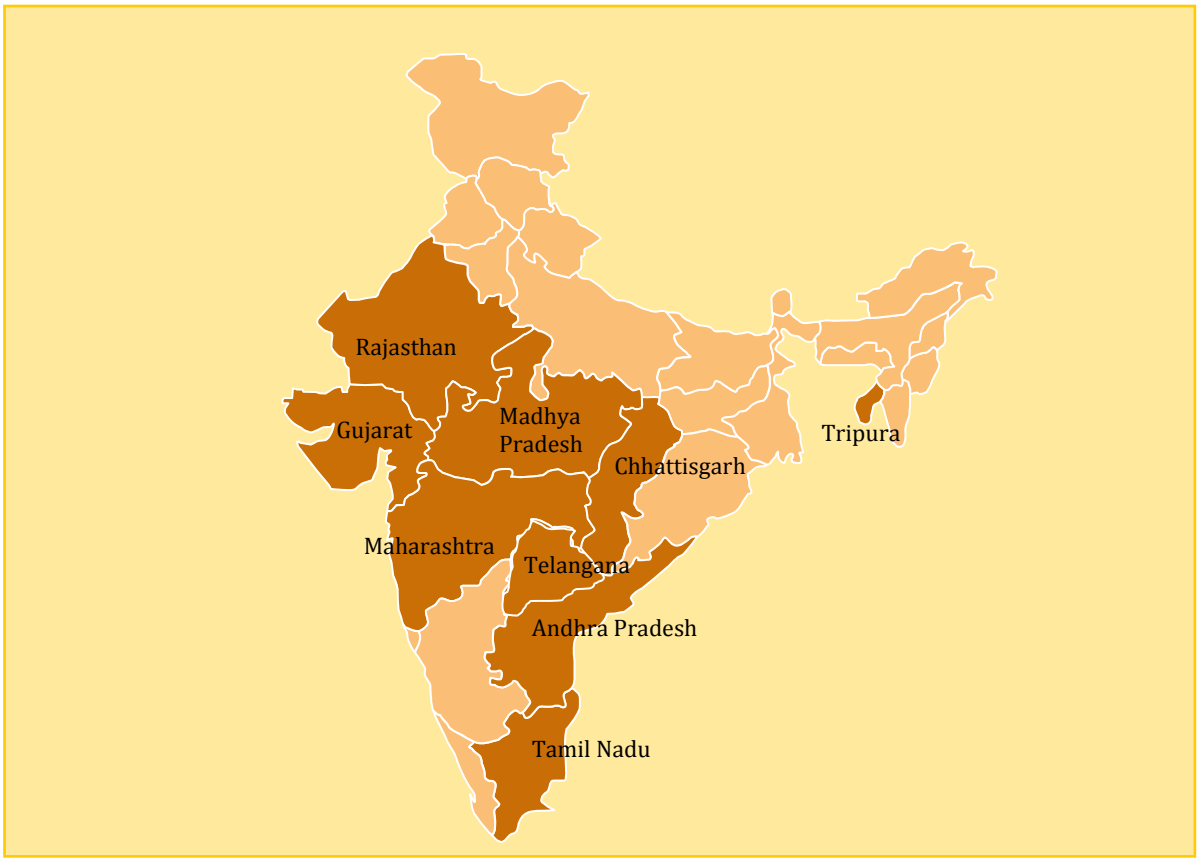


Figure 151: *Manufacturing Clusters*

Top 10 states account to 96% of total employment in the Soya Processing industry

Market Overview

During the last financial year i.e., 2020-21, Soybean processing stood at ~19.8 million tonnes. Processing of soybean has been cyclical for 5-6 years.

Maharashtra and Madhya Pradesh are the major soya processing State in India. Other prominent states are Gujarat, Rajasthan and Karnataka. In the last 5 years soya processing industry has grown at 7.8% CAGR. [49]

[49] Source: http://www.sopa.org/yearly-processing-of-soybean-production-of-meal-oil-october-september/

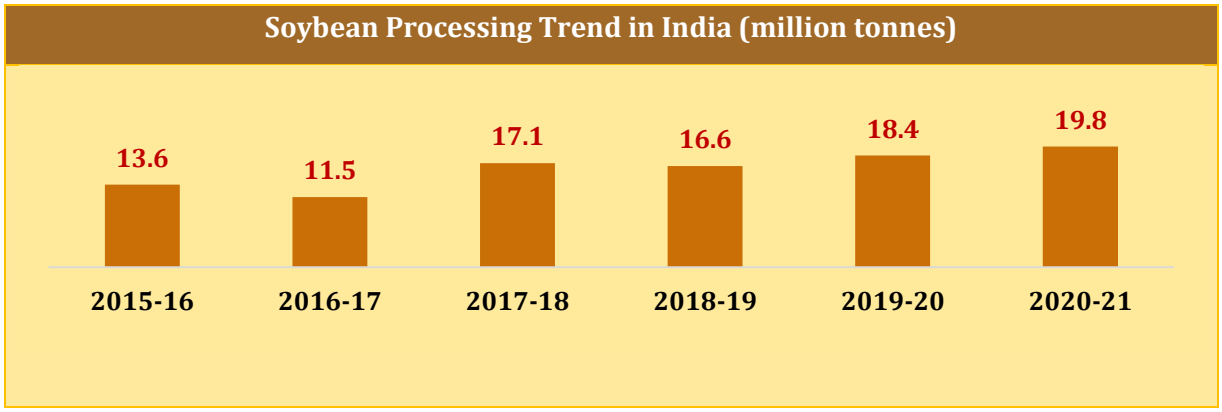


Figure 152: *Soybean Processing Trend in India (million tonnes)*

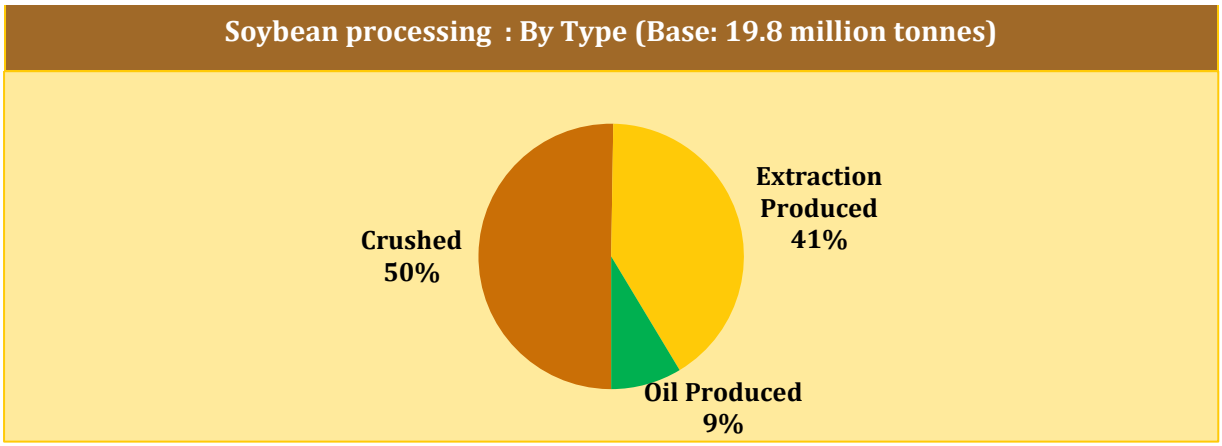


Figure 153: *Soybean processing: By Type*

Source: SOPA

14.3 Present Employment Scenario & Analysis

Category of the Companies by Revenue

The Soya Processing industry is generally classified based on capacity. For uniformity, the enterprises have been classified based on their revenue as per RBI guidelines. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

14.3.1 Sample Coverage by Categories of Companies & Region

The detailed primary research exercise undertaken by Feedback Consulting for this report involved meeting over 91 companies across India. This also covered various category of players. 48% of these companies were Micro and Small Enterprises and ~73% of these companies were clustered in Northern and Western region in India.

Category of the Company	Sample Coverage (N)	North	West	South
Micro Enterprises	**26**	**38%**	**38%**	**24%**

Category of the Company	Sample Coverage (N)	North	West	South
Small Enterprises	40	39%	32%	29%
Medium Enterprises	20	32%	42%	26%
Large Enterprises	5	44%	33%	22%
Total	91	36%	37%	26%

Table 128: Sample Coverage by Categories of Companies & Region

14.3.2 Total No. of Employees

Past Trend of employment in the Soya Processing Industry

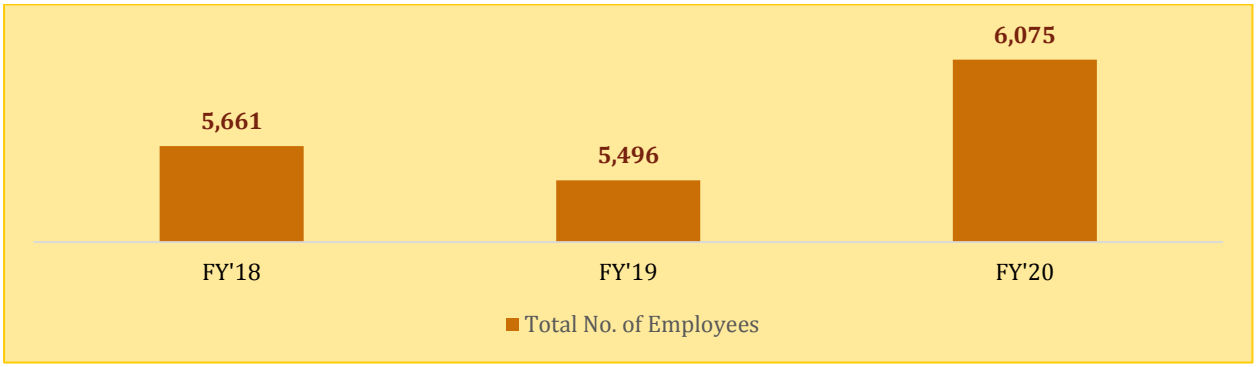
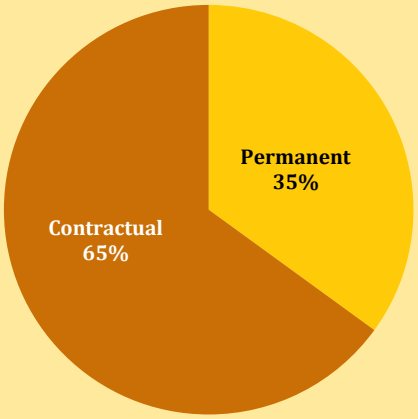
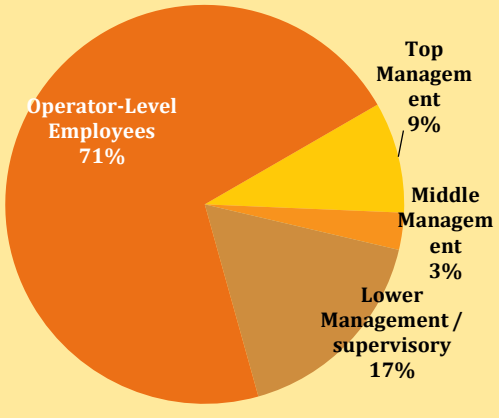


Figure 154: Past Trend of employment in the Soya Processing Industry

Source: Feedback Analysis

Share of Employees (FY' 20) : Break by Different Category

Permanent Vs Contractual Employees (Base: 6,075)	Share by Managerial Level (Base: 6,075)
	

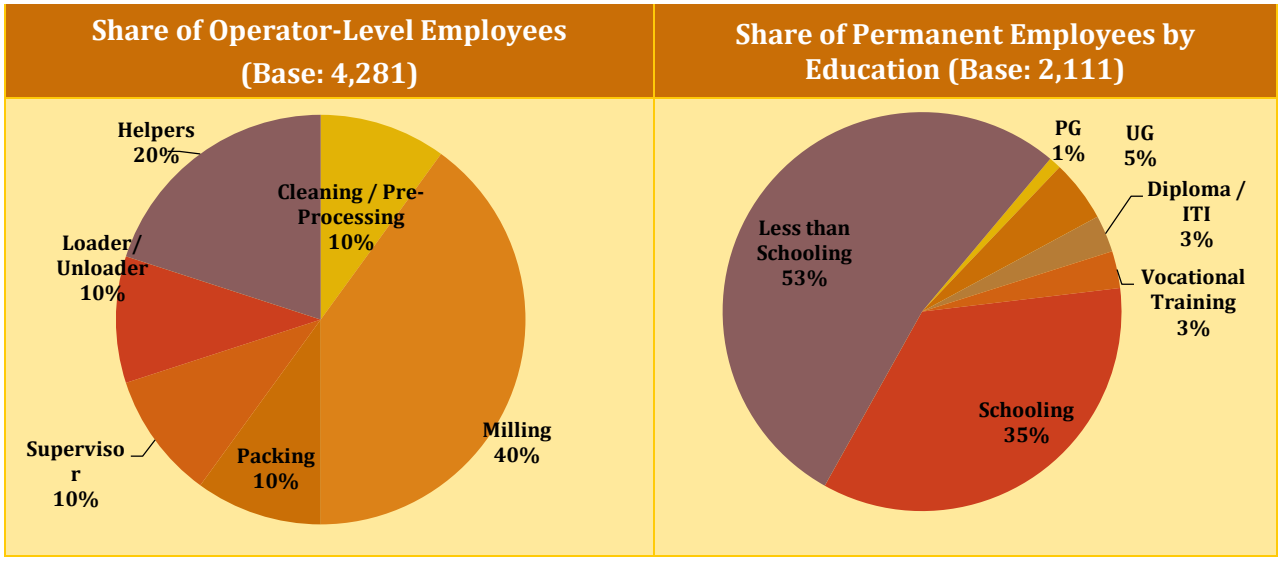


Figure 155: Share of Employees (FY'20): By Different Category

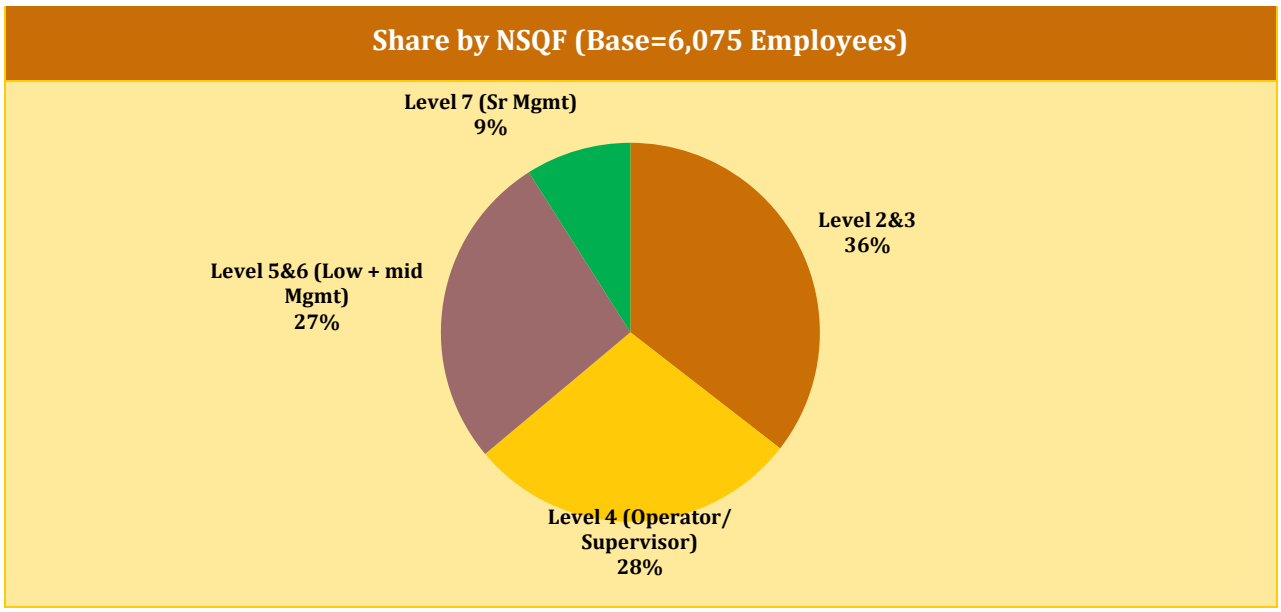


Figure 156: Share of Employees (FY'20): By NSQF levels

Source: Feedback Analysis

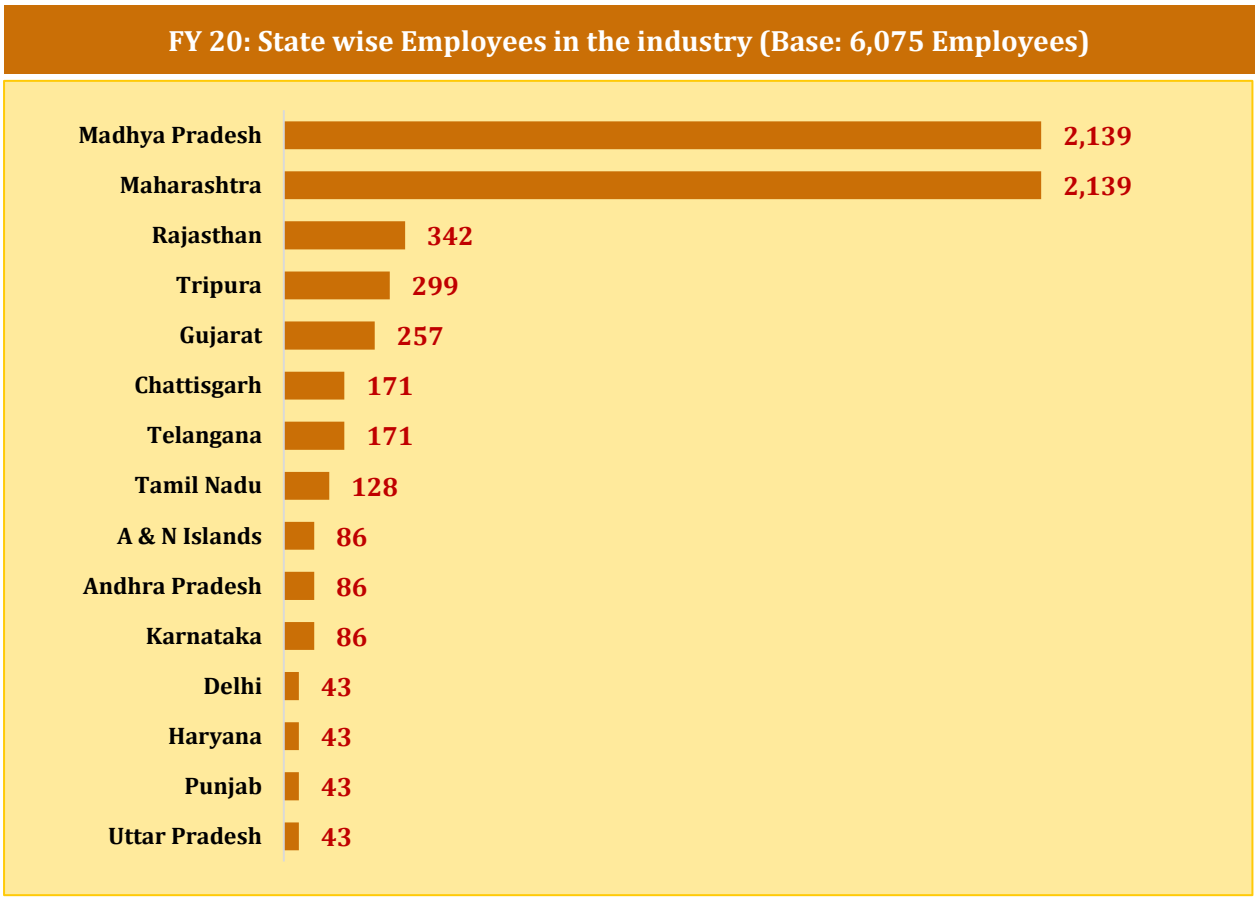


Figure 157: State wise Employees in the Industry (FY'20)

Source: Feedback Analysis

Top 15 states account to 100% of total employment in the industry

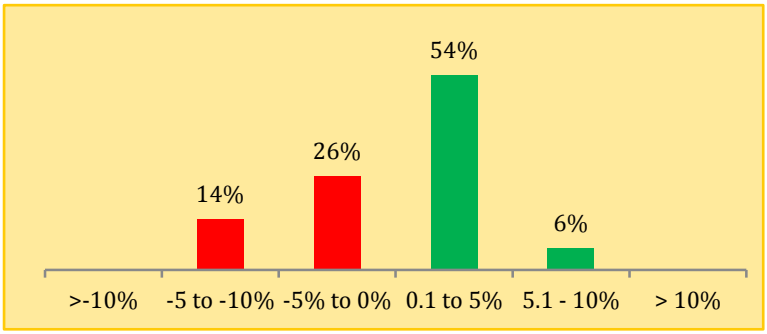
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Pre-Processing Labourers	The pre-processing work includes primarily grading, sorting of soya beans.	3		✓	✓	✓
2	Processing Labourers	Machine operators, Millers, processing labourers across various processing functions	4			✓	✓
3	Plant Operators	Operate machines based on various processing and by-product production lines.	4	✓	✓	✓	✓

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
		Supervise the manual labourers at the operations					
4	Helpers	Misc. work including Cleaning plants, Machinery after every batch, etc.	3	✓	✓	✓	
5	Loader / Unloader	Material handling, Loading & Unloading products.	3	✓	✓	✓	✓
6	Sales and Distribution Support	Sales Executives / Distribution to the Channel Partners	4			✓	✓

Table 129: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

14.3.3 Past Growth of Employees (FY'17 – FY'20)



- ~60% have indicated that their manpower has grown in the last three years, predominantly marginal growth of up to 5%.

Figure 158: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

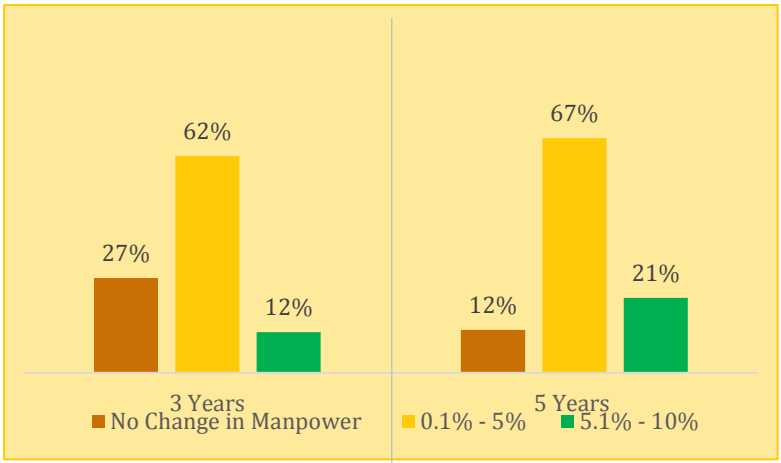
14.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies covered

Plans	Micro	Small	Medium	Large
Planning to invest in Internet of Things (IoT) or Automation	0%	0%	0%	22%
Plan to invest on new equipment / New Facility	12%	7%	0%	22%
Plan to enhance the production capacity	26%	12%	21%	80%
Plans to launch new products	26%	0%	14%	0%
Plans to increase exports	0%	0%	14%	0%

Table 130: Future Plans of the Companies

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- ~2% in next 3 years (Average)
- 2 - 3% in next 5 years (Average)

Figure 159: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

Source: Feedback Analysis

14.4 Recruitment & Training Practice

Recruitment Practice

Walk-in is the key source of recruiting candidates across Operational level and Lower-level employees. Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal Education Institutes offering Food Tech / Food Science programs
Middle Management	• Formal Education Institutes offering Food Tech / Food Science programs
Lower-Level Management	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 131: Recruitment Practice

Training Practice

Overall, 40 – 45% of the companies covered during the survey, were providing training to new employees, across levels (On-the-Job training).

% of Companies offering training

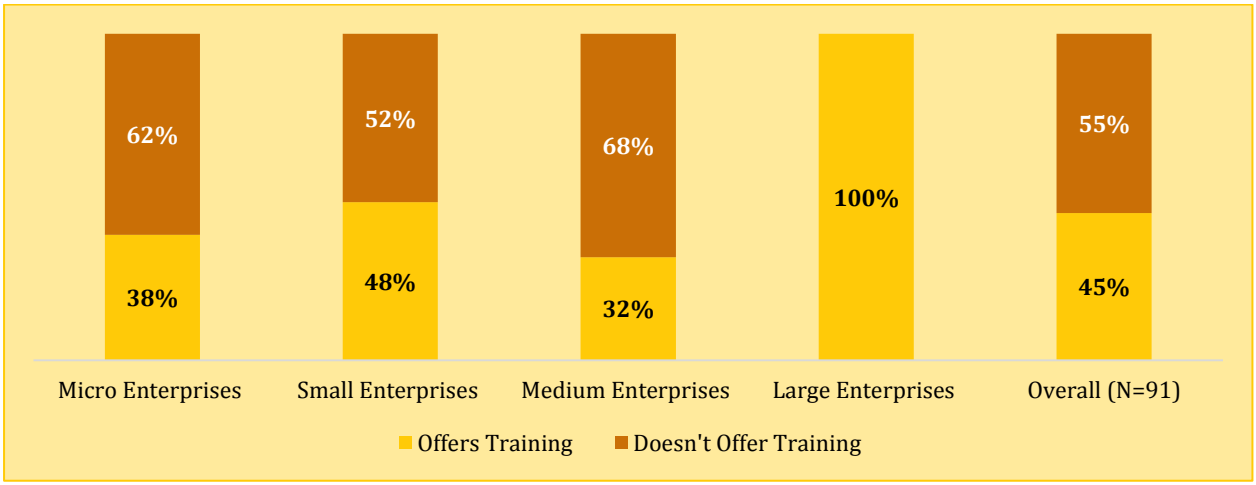


Figure 160: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Processing Operations	Proper Sorting; grading the raw soybeans. Differentiating for various processing	Operator Level Employees	✓	✓	✓	✓
Processing / Milling techniques	Operating processing machines	Operator Level Employees; Lower-Level Employees; Supervisors / Managers	✓	✓	✓	✓
Packing	Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio	Operator Level Employees; Lower-Level Employees; Supervisors / Managers				✓

Table 132: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

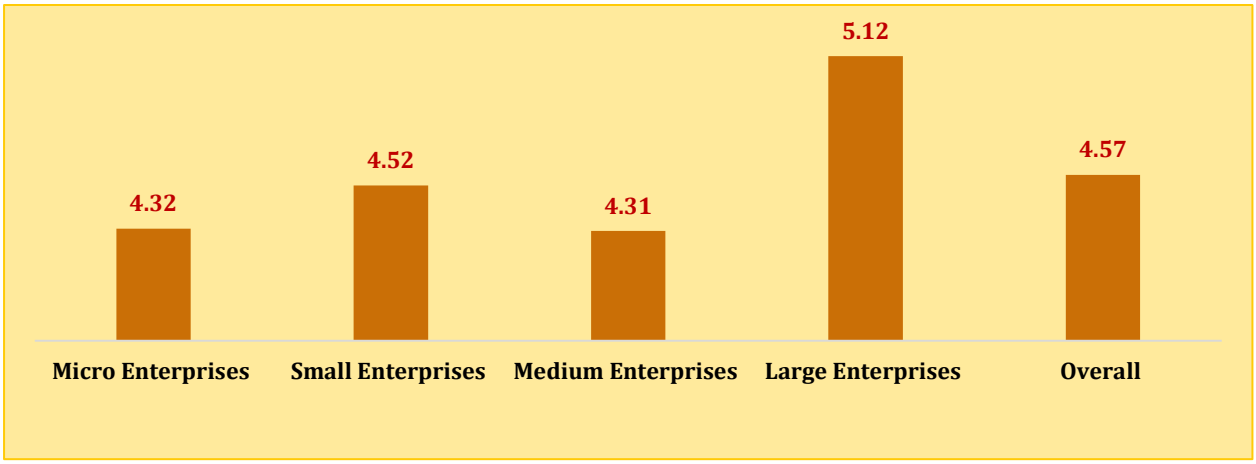


Figure 161: Effectiveness of Training

Source: Feedback Analysis

14.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

- There are very limited training institutes in India that focuses Milling (where Soya Processing is also part of it).
- There are few companies like Buhler, which is offering training programs (Certification programs) along with CFTRI. The challenge here is these programs are hardly known among the Soya processers fraternity
- Small and Micro units depend on walk-ins or known contacts for unskilled or semi-skilled labours. Also, there are higher attrition which is mandating that supervisors have to be involved in training on a daily basis

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Pre-Processing	Operator Level Employees NSQF: 3	• Understanding the products being produced from Soya and grade / sort the beans accordingly	• Lack of knowledge on products and the raw materials quality required for the processing	✓	✓		

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Shift Supervisor / Supervisor	Lower-Level Management NSQF: 5	• Overseeing operations including material handling across functions • Equipment operations and maintenance	• Best practices w.r.t material handling to reduce wastage during material handling • Lack of knowledge on By-Products of Soya Processing	✓	✓	✓	✓
Maintenance Officer	Lower-Level Management NSQF: 4	• Knowledge on latest equipment and the old equipment (primarily for maintenance) • Domain Skills	• Lack of update in technology	✓	✓	✓	✓
Loading / Unloading Laborers	Operator Level Employees NSQF: 3	• Materials Handling	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	✓
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygienic awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓	✓	

Table 133: Key job roles and their required skills and skill gaps

14.6 Future Projection – Sector & Employment

Projected growth in Soya Processing Segment in India

Based on discussions conducted with the Visionaries and Industry experts, Indian Soya Processing likely to reach approx. 34 Mn tons by FY'30. This indicates CAGR of approx. 6 - 7%. Reasons for such growth are the followings:

- As increasing number of consumers seeking non-dairy beverage alternatives, this has led to substantial growth in the demand for soy milk in the country. New production technology coupled with new varieties of soybeans have resulted in introduction of new flavours which are giving tough competitions to cow milk and dairy products. Furthermore, increasing health consciousness among Indian population and various health benefits of soy milk are driving the growth of Indian Soya processing industry.
- Soybean has experienced rapid expansion in production area and production volume, usage of high quality and high yield seeds etc. within a short span of time in the recent past. Incentives provided by the Govt. in the form of subsidized inputs, price support for output, marketing infrastructure etc. have facilitated rapid growth in Soybean production in the country. Needless to say, relative profitability of soybean is better than competing crops which has also contributed to this growth. The trend is likely to continue in the coming years.
- Unlike Cow Milk and other dairy products, Organized retail is a key channel for selling processed Soya products. Recent emergence of various organized retail formats such as Hypermarket, Supermarket etc. has not only helped in creating awareness regarding health benefits of processed Soya products but also improved visibility and availability of processed Soya products in the market. As high as approx. 50% of processed Soya products are sold through organized retail in the country. Processed Soya market likely to experience strong growth as share of organized retails is steadily increasing in the country.
- Soybean meals are also used in food and animal feeds as a protein supplement. Strong export demand and increased crop availability have driven soybean meal exports for the current season and the trend expected to continue in future.

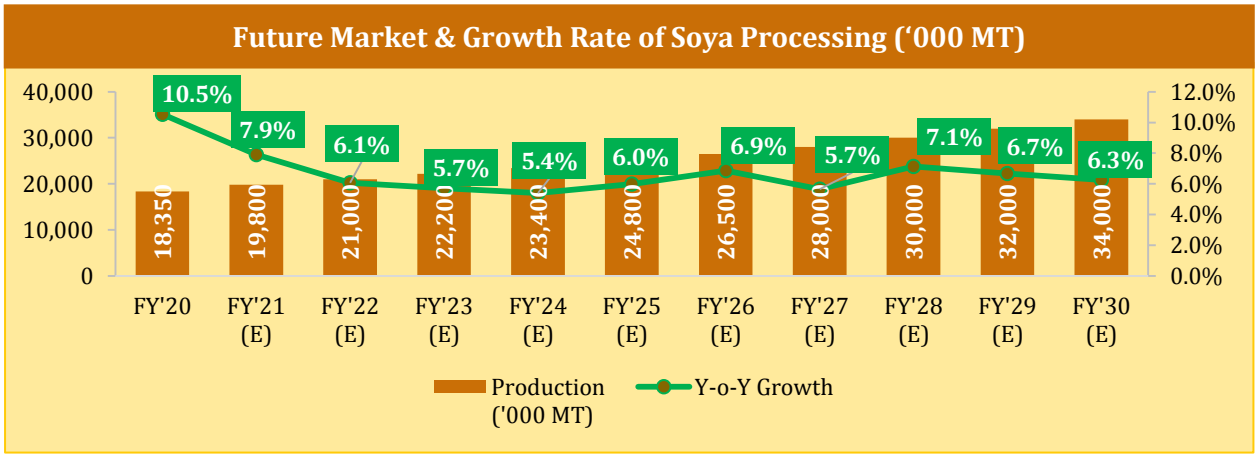


Figure 162: *Future Market & Growth Rate of Soya Processing ('000 MT)*

Source: Discussion with SMEs & Visionaries

Processing capacity and investment required in Soya processing industry

Parameter	Unit	Values
FY'20 Production	'000 MT	18,350
FY'30 Production (E)	'000 MT	34,000
Increase in production between FY'20 & FY'30	'000 MT	15,650
Considering 80% capacity utilization, additional processing capacity required	'000 MT	19,563
Investment norm	Rs. / MT	2,625
Total Investment required	**Rs. Cr.**	**5,135**

Table 134: Processing capacity and investment required in the sector

Source: SOPA; Discussion with the Plant / Equipment Manufacturers & SMEs

Select ongoing and upcoming projects of Soya Processing Sector in India

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Adani Wilmar Ltd.	Haldia Soya Nuggets Plant Project	Haldia, West Bengal	New Unit	Not Available
2	Adani Wilmar Ltd.	Vidisha Soya Nuggets Processing Plant Project	Vidisha, Madhya Pradesh	New Unit	Not Available
3	Patanjali Food & Herbal Park Pvt. Ltd.	Ausa Soybean Processing Unit Project	Latur, Maharashtra	New Unit	Not Available

Table 135: Select ongoing and upcoming projects of Soya Processing Sector in India

Source: CMIE & Projects Today

FY'20 employment estimation in Soya Processing industry in India

Company Category	Average no. of Employees	FY'20 Total No. of Employees in Soya processing	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	200	1,000	19%	3,487	3,487
Medium Enterprises	83	2,490	42%	7,707	3,095
Small Enterprises	32	1,760	27%	4,955	2,815
Micro Enterprises	11	825	12%	2,202	2,669
Total		**6,075**	**100%**	**18,350**	**3,021**

Table 136: FY'20 employment estimation in Soya Processing industry in India

**Discussion with the Processing Units and SMEs*

Note: The Soya Processing industry is generally classified based on capacity. For uniformity, the enterprises have been classified based on their revenue as per RBI guidelines. Large companies: > Rs. 250 Cr., Medium: Rs. 50 - 250 Cr., Small: Rs. 5 - 50 Cr. and Micro: <Rs. 5 Cr.

Future employment projection in Soya Processing industry in India

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	19%	6,460	3,487	1,853	853
Medium Enterprises	42%	14,280	3,095	4,614	2,124
Small Enterprises	27%	9,180	2,815	3,261	1,501
Micro Enterprises	12%	4,080	2,669	1,529	704
Total		**34,000**		**11,256**	**5,181**

Table 137: Future employment projection Soya Processing industry in India

**As per discussion with the Processing Units and SMEs, contribution of various types of companies in the Grounded & Blended Spices industry will remain same over next 10 years*

 # Based on discussions with equipment manufacturers and SMEs, there could be marginal adoption of automation / industry 4.0 in the coming years. However, that will have negligible impact on the productivity of the employees. Hence, the same productivity values have been considered for future employment generation potential

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category

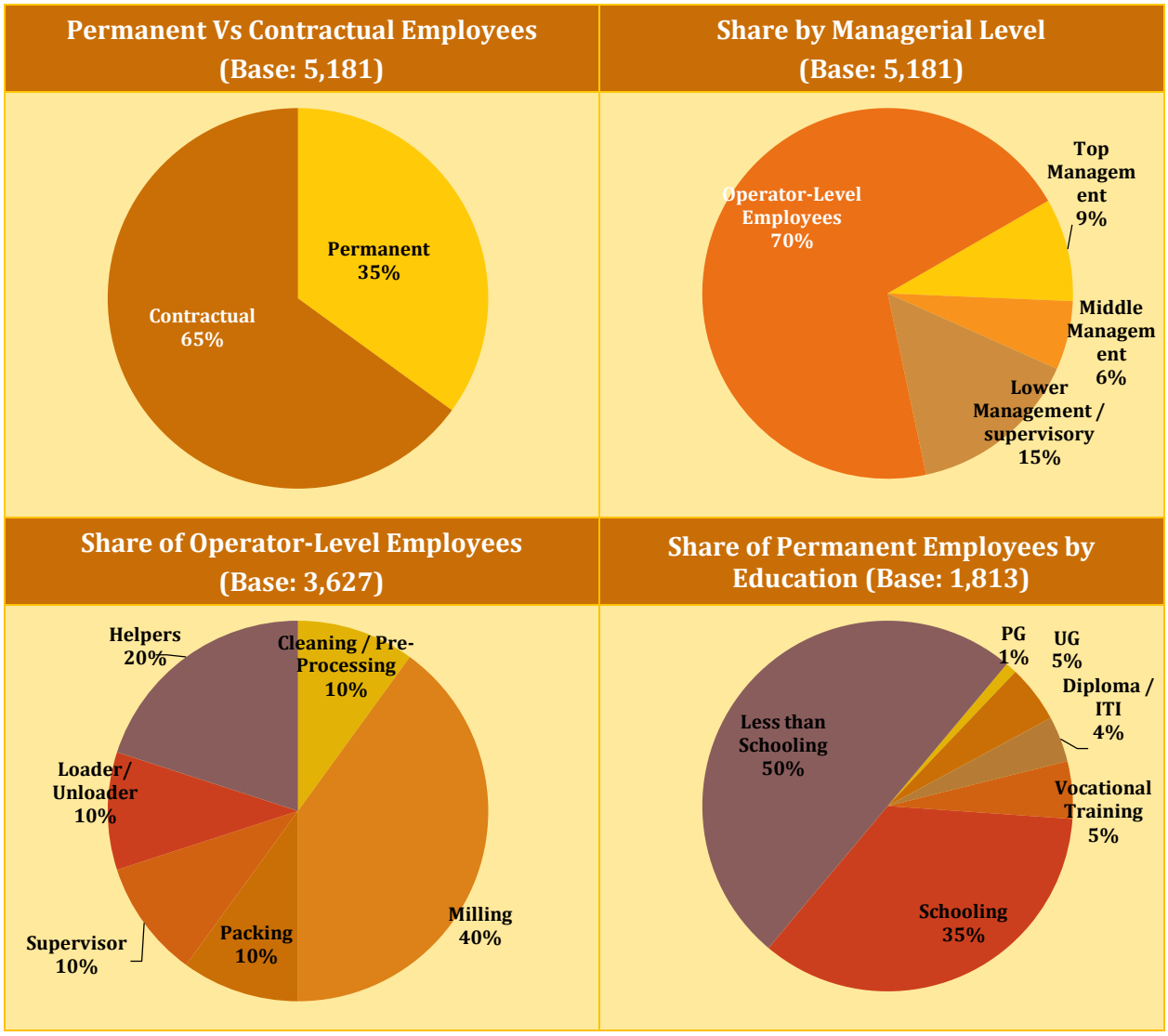


Figure 163: Share of FY'20 - FY'30 Employment Generation potential: By Different Category

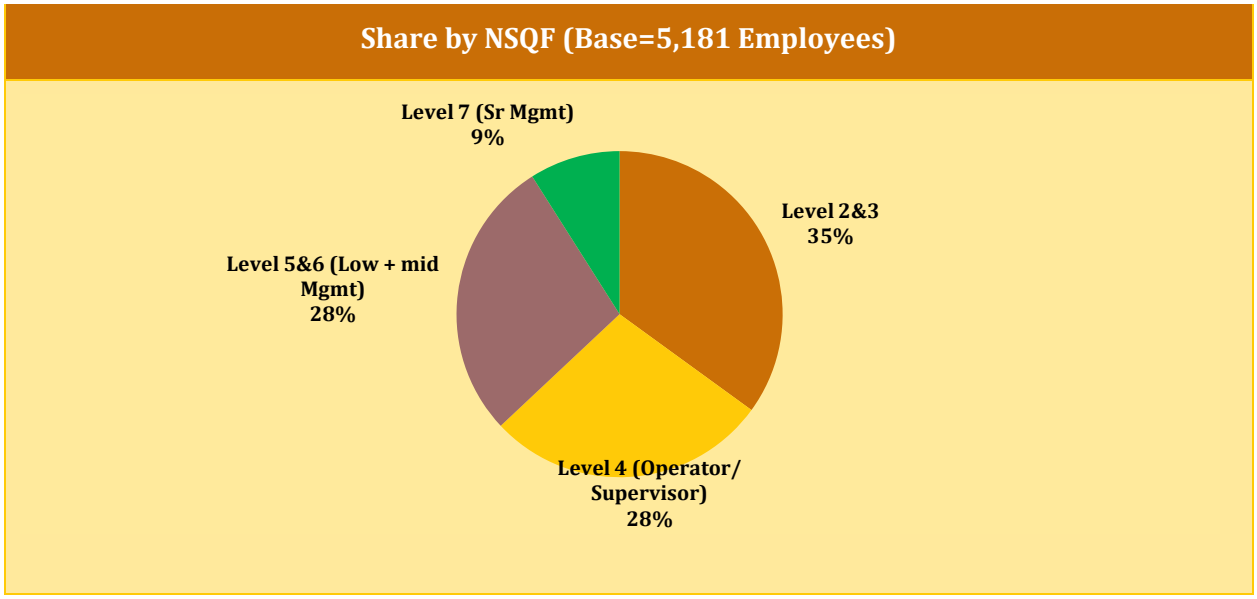


Figure 164: Share of FY'20 - FY'30 Employment Generation potential: By NSQF levels

Source: Feedback Analysis

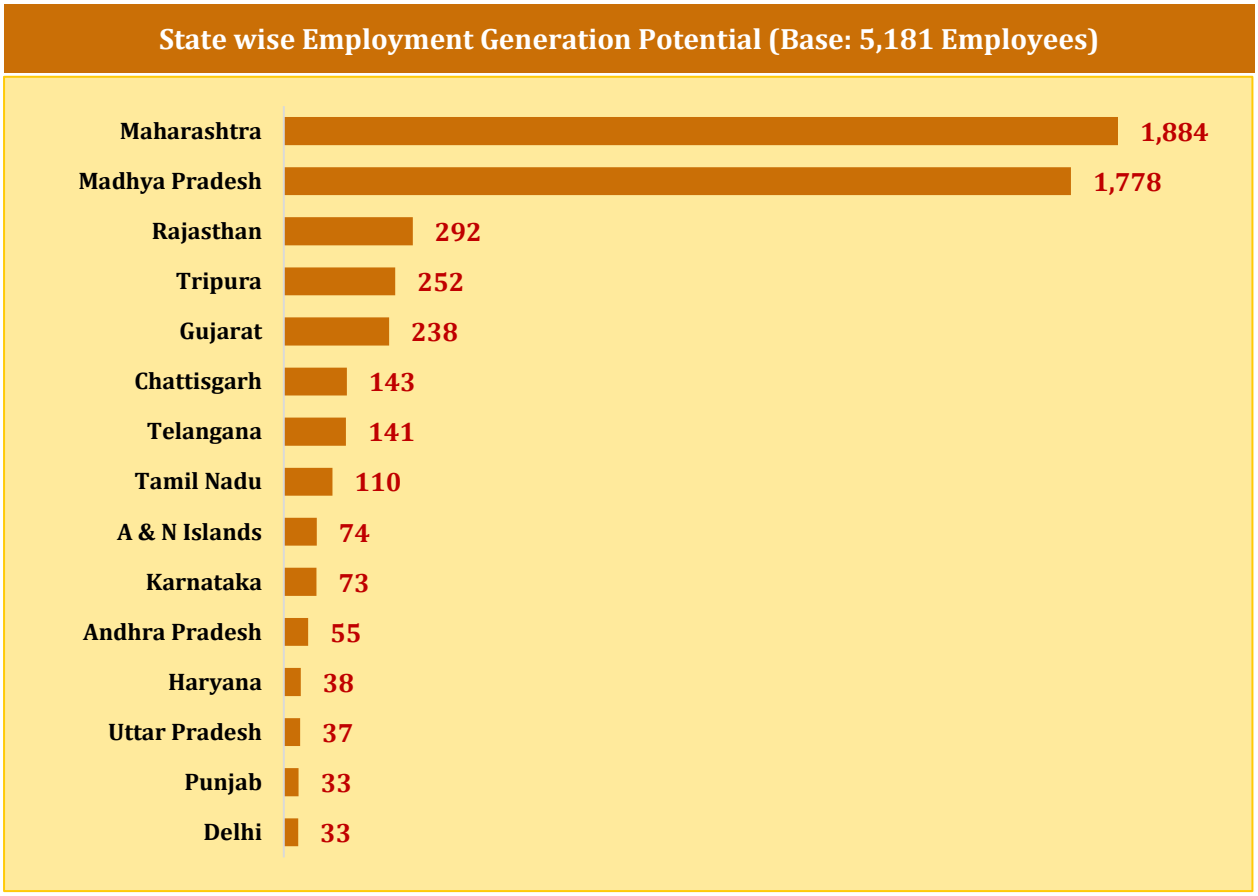


Figure 165: State wise Employment Generation Potential

Source: Feedback Analysis

Top 15 states account to 100% of total employment in the industry

14.7 Existing & Emerging Prominent Job Roles Which Requires Skilling

Following are the specific existing and emerging prominent job roles that will create employment opportunities in Soya Processing Sub-sector in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader &	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies.	✓	✓	✓	

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Unloader		activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	• Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.				
Soya Seed Cleaner & Pre-Processor	3	A Soya Seed Cleaner & Pre-Processor is responsible for carrying out various labor-intensive activities such as cleaning and grading soya, feeding soya in dry beans tank, etc.	**A Soya Seed Cleaner & Pre-Processor must be able to:** • Clean and grade soybean • Feed soybean in dry beans tank **A Soya Seed Cleaner & Pre-Processor must know and understand:** • Appropriate handling of soybeans • Applicable cleaning and grading standards for soybean		✓	✓	✓
Soya Milling Machine Operator	4	A Soya Milling Machine Operator is responsible for preparing and operating milling machine to mill soya to process required products. The individual also	**A Soya Milling Machine Operator must be able to:** • Prepare the milling machine for operation • Carry out general maintenance of the milling machine	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		carries out general maintenance of the milling machine.	**A Soya Milling Machine Operator must know and understand:** • How to operate and maintain a milling machine • Applicable food hygiene and safety standards				
Soya Nugget Machine Operator	4	A Soya Nugget Machine Operator is responsible for operating nugget machineries for processing soya into nuggets.	**A Soya Nugget Machine Operator must be able to:** • Operate soya nugget processing machineries appropriately • Maintain processing machines **A Soya Nugget Machine Operator must know and understand:** • Different type of machines used in soya processing • Process of operating various machines • How to perform general maintenance of various soya processing machine			✓	✓
Soya Flour Packaging Machine Operator	4	A Soya Flour Packaging Machine Operator is responsible for handling the milled flours, preparing, and operating the packaging machine and performing general maintenance of the flour	**A Soya Flour Packaging Machine Operator must be able to:** • Protect the packaging contents from spoilage & spillage. • Design appropriate packaging. • Carry out maintenance of the packaging equipment. **A Soya Flour Packaging Machine Operator must know and understand:**		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		packaging machine.	• How to perform general maintenance of the packaging equipment. • Applicable food hygiene and safety standards.				
Soya Oil Pouch Packing Machine Operator	4	A Soya Oil Pouch Packing Machine Operator is responsible for handling the milled oils from oilseeds. Also performing general maintenance of the oil pouch packaging machine.	**A Soya Oil Pouch Packing Machine Operator must be able to:** • Protect the packaging contents from spoilage & spillage. • Design appropriate packaging. • Carry out maintenance of the packaging equipment. **A Soya Oil Pouch Packing Machine Operator must know and understand:** • How to perform general maintenance of the packaging equipment. • Applicable food hygiene and safety standards.		✓	✓	✓
Soya Processing Plant Supervisor	5	A Soya Processing Plant Supervisor is responsible for scheduling and allocating tasks to workers, monitoring their performance, ensuring correct functioning of the machineries and overall maintenance of the plant.	**A Soya Processing Plant Supervisor must be able to:** • Schedule activities and allocate task to plant workers • Monitor and check plant machineries and systems for the correct functioning • Maintain safety and discipline at the plant • Oversee soya processing plant maintenance **A Soya Processing Plant Supervisor must know and understand:**	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Relevant health, hygiene, and safety standards • Different soya processing methods				
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.	✓	✓	✓	✓

Table 138: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

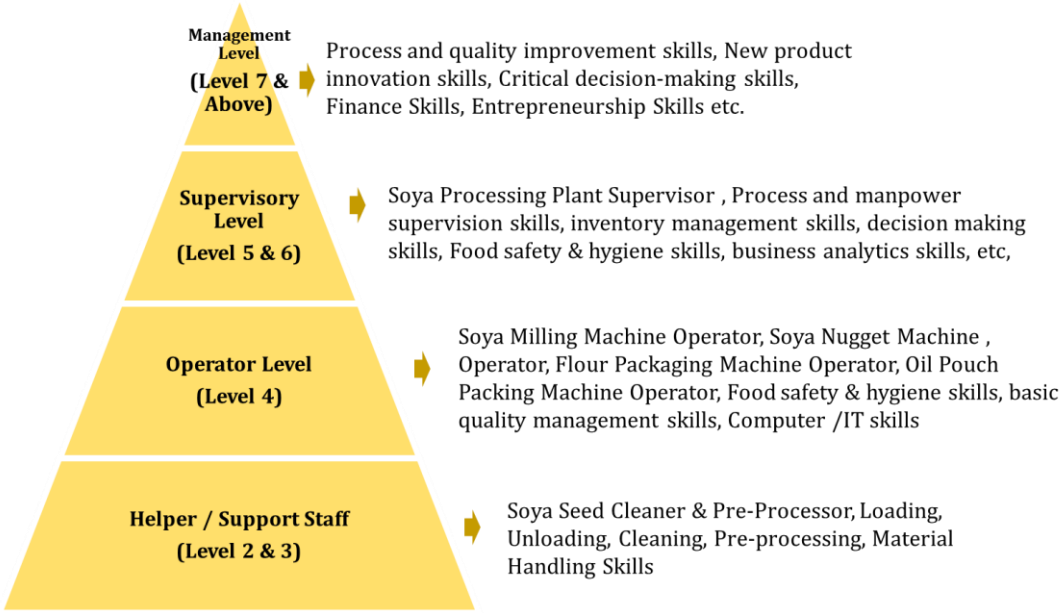


Figure 166: Skill Sets required across multiple levels in the sector

14.8 Expectations from the Industry Stakeholders

Importance of Training

- As there are very limited number of companies across India, recruiting experienced skilled manpower (experienced in similar product) is a major challenge for the industry and thus training plays an important role not only for the fresh candidates, but also for the existing employees
- Training institutes focusing Soya Processing are very limited. Industry is expecting to have a training program specific to Soya processing and not just as part of Milling module.

Training for Multi-Functions

- As soya have multi usage applications, the training programs are to be developed for the Soya Processing and not just for applications like Bakery, Dairy, etc.
- Multiskilling is the key by introducing them to multiple skills required by the industry so that the employee can be fill in across any functions (Processing machinery, packaging machinery operations, pre-processing, etc.)
- The food safety may be the first and foremost concept for the Government to give training to each and every person. It becomes extremely important to sensitize employees on the importance of maintaining stringent hygiene standards. This is one area where the government needs to lay a lot of emphasis on.

Offline with Practical Training

- Online training may not help here as the program needs practical training and creating institutes at the clusters will solve the manpower crisis of the industry

Chapter 15: Sub-Sectoral Analysis – Spices

15.1 Market summary

India is the world's largest producer, consumer and exporter of spices. The country produces about 75 of the 109 varieties listed by the International Organization for Standardization (ISO) and accounts for half of the global trading in spices. Spices has many different applications including bakery products, sauces, dressings, beverages, frozen foods, and package foods. Indian blended spices market is highly fragmented and there are very limited number of players having pan India presence. Grounded & Blended Spices market have shown a healthy growth of 8.4% in India over the past 5 years. An increasing population of educated & working women and raising consumer's awareness towards adulteration has created a huge demand for branded blended spices. The growth of blended spices and spices mix has opened a new segment for many of the players and it is currently largely consisting of regional players. The Government of India through its body Spices Board of India, is also propelling aggressively to export the Indian spices to gain the market share and market value prominently with the help of promotions and branding during international fairs. The spice industry is expected to benefit from the package announced for the MSME units as well as from the package for the agriculture sector. Sub-components like 'formalization & global outreach of micro food enterprises', 'farm-gate infrastructure development' and 'promotion of herbal cultivation' are beneficial to the sector.

Key Industry Indicators	Details
Overall Market ('000 MT) (FY'20)	185
No. of registered units	1,063
Past Growth rate (CAGR) (FY' 15 – FY' 20)	9.5%
Total Number of Employees (FY' 20)	40,750 nos.
Overall Exports (FY'20)	INR 14,638 Crs.
Expected Market ('000 MT) FY' 2030	620
Future growth rate (FY' 20 – FY' 30)	12.9%
Total Employee Estimation (FY' 30)	1,34,844 nos.
Overall Employment Additions (FY' 20 – FY' 30)	94,094 nos.

Table 139: *Spices: Key Industry Indicators*

15.2 Present State of the Industry & Future Outlook

India is the world's largest producer, consumer and exporter of spices. The country produces about 75 of the 109 varieties listed by the International Organization for Standardization (ISO) and accounts for half of the global trading in spices.

52 Spices out of 75 Spices under the purview of the Spices Board of India[50]			
1. Cardamom	2. Pepper	3. Chilli	4. Ginger
5. Turmeric	6. Coriander	7. Cumin	8. Fennel
9. Fenugreek	10. Celery	11. Aniseed	12. Bishops weed
13. Caraway	14. Dill	15. Cinnamon	16. Cassia
17. Garlic	18. Curry Leaf	19. Kokkam	20. Mint
21. Mustard	22. Parsley	23. Pomegranate seed	24. Saffron
25. Vanilla	26. Tejpat	27. Pepper long	28. Star anise
29. Sweet flag	30. Greater Galanga	31. Horse Radish	32. Caper
33. Clove	34. Asafoetida	35. Cambodge	36. Hyssop
37. Juniper berry	38. Bayleaf	39. Lovage	40. Marjoram
41. Nutmeg	42. Mace	43. Basil	44. Poppyseed
45. All-spice	46. Rosemary	47. Sage	48. Savory
49. Thyme	50. Oregano	51. Tarragon	52. Tamarind

Table 140: Spices under the purview of the Spices Board of India

Spices are parts of a specific tree that are edible, have medicinal properties, and can completely impact the flavour of a particular dish. Cinnamon, for example, is the bark of its namesake tree, cloves are flower buds, bay leaves are the leaf of its plants, cardamoms are seeds, and in the same way all other spices are also dried plant parts to be used in culinary arts, except herbs can be used fresh as well.

Spices has many different applications including bakery products, sauces, dressings, beverages, frozen foods, and package foods. Spices are an integral part of any Indian dishes which are used for flavouring, seasoning, pungency and colouring.

[50] Spices Board of India

Key Stakeholders in the Value Chain

Indian market is highly fragmented with more than 1000 small and micro manufacturers and limited Large and Medium players producing blended spices. There are very limited number of players having pan India presence with a strong channel network and multiple plants across India. Industry structure of blended spice is illustrated in the chart below:

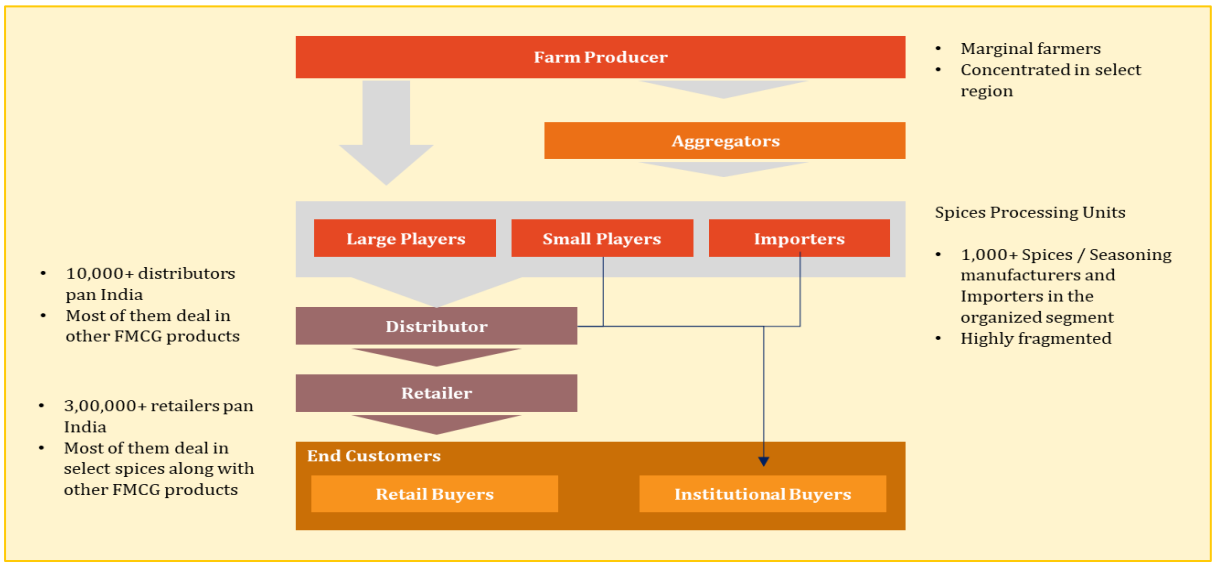


Figure 167: *Value chain of Spice Market in India*

Manufacturing Clusters: Spices

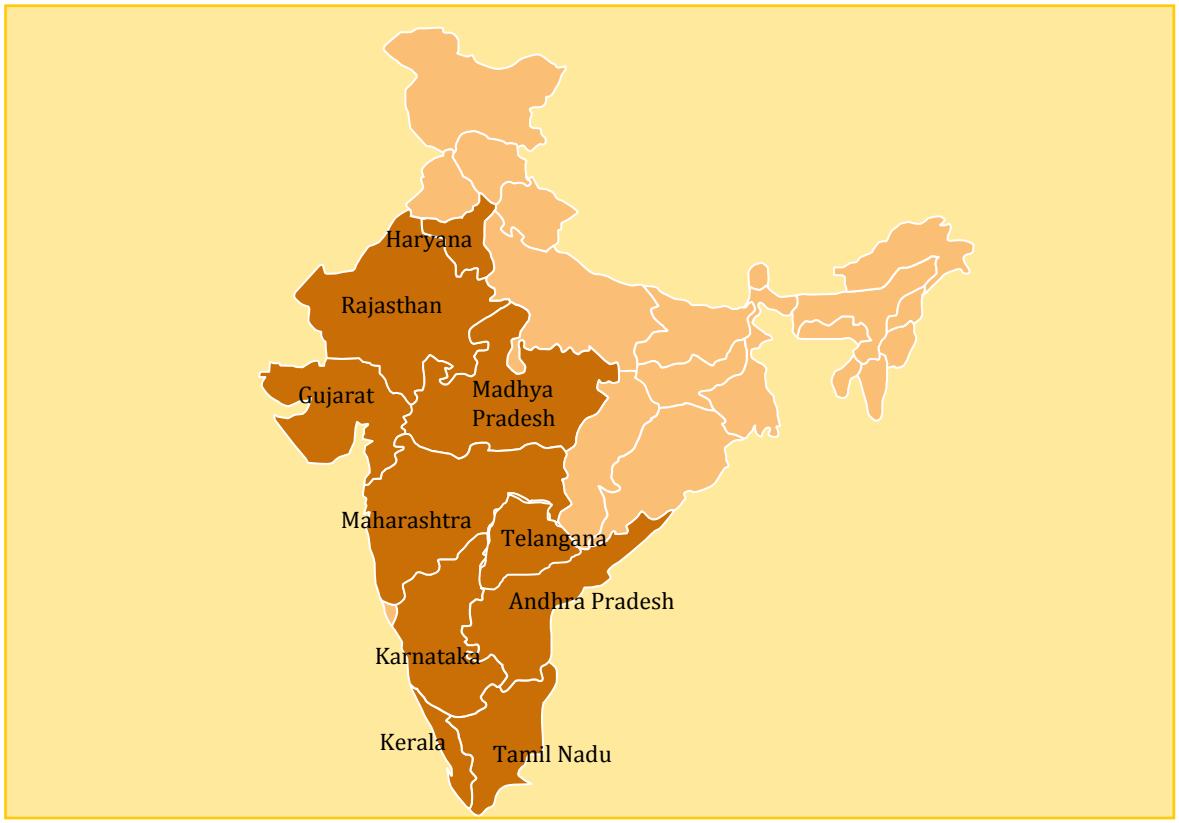


Figure 168: *Manufacturing Clusters*

Top 10 states account to 77% of total employment in the Spices industry

Grounded & Blended Spices – Market Overview

Grounded & Blended Spices market have shown a healthy growth of 8.4%[51] in India over the past 5 years.

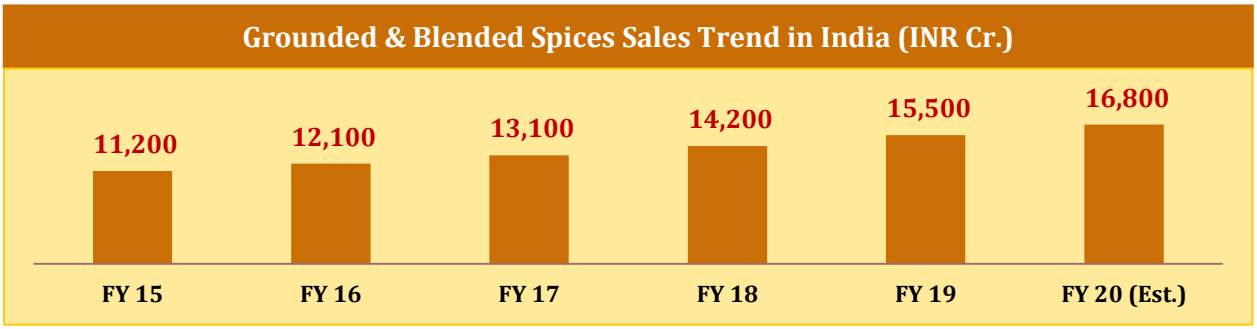


Figure 169: Grounded & Blended Spices Sales Trend in India (INR Cr.)

Source: Feedback Analysis

An increasing population of educated & working women and raising consumers awareness towards adulteration has created a huge demand for blended spices.

The higher purchasing power due to the overall economic development of India has also let to various changes in the preference of Indian consumers. Increasingly, consumers have been observed to be shifting from Standard, Local and Regional brands towards National Branded Products.

The consumption of foreign brands is also observed to be increasing in Indian Blended Spices market. The growth of blended spices and spices mix has opened a new segment for many of the players and it is currently largely consisting of regional players.

15.3 Present Employment Scenario & Analysis

Category of the Companies by Revenue

Category of the Company	Definition (Revenue Range)	Remarks
Micro Enterprises	< Rs 5 Cr	Micro enterprises are into blending or processing of primarily Traditional Spices with revenue of < Rs. 5 Cr.
Small Enterprises	RS 5.1 – 50 Cr	Small enterprises primarily process Pure & Traditional Spices, Meat Masala and Ready to Prepare Masalas. many Small enterprises also take up contract manufacturing jobs from the large enterprises. Revenue range for this category is Rs. 5 Cr. - 50 Cr.
Medium Enterprises	Rs 50.1 – 250 Cr	Medium-Sized Enterprises are predominantly regional manufacturers with revenue of Rs. 50 Cr - 250 Cr.
Large Enterprises	> Rs 250 Cr.	Large Enterprises are pan India players that process various types of blended masala categories with overall revenue of > Rs. 250 Cr.

[51] Feedback BoK, Spices Board of India, Subject Matter Expert

Table 141: Category of the Companies : By Revenue

15.3.1 Sample Coverage by Categories of Companies & Region

The detailed primary research exercise undertaken by Feedback Consulting for this report involved meeting over 380 companies across India. This also covered various category of players.

90% of these companies were Micro and Small Enterprises and ~70% of these companies were clustered in Southern and Western region in India.

Category of the Company	Sample Coverage (N)	North	East	South	West
Micro Enterprises	**184**	**18%**	**15%**	**36%**	**31%**
Small Enterprises	**161**	**17%**	**11%**	**45%**	**27%**
Medium Enterprises	**30**	**17%**	**7%**	**37%**	**40%**
Large Enterprises	**5**	**40%**	**0%**	**60%**	**0%**
Total	**380**	**18%**	**12%**	**41%**	**29%**

Table 142: Sample Coverage by Categories of Companies & Region

15.3.2 Total No. of Employees

Past Trend of employment in the Spices Industry

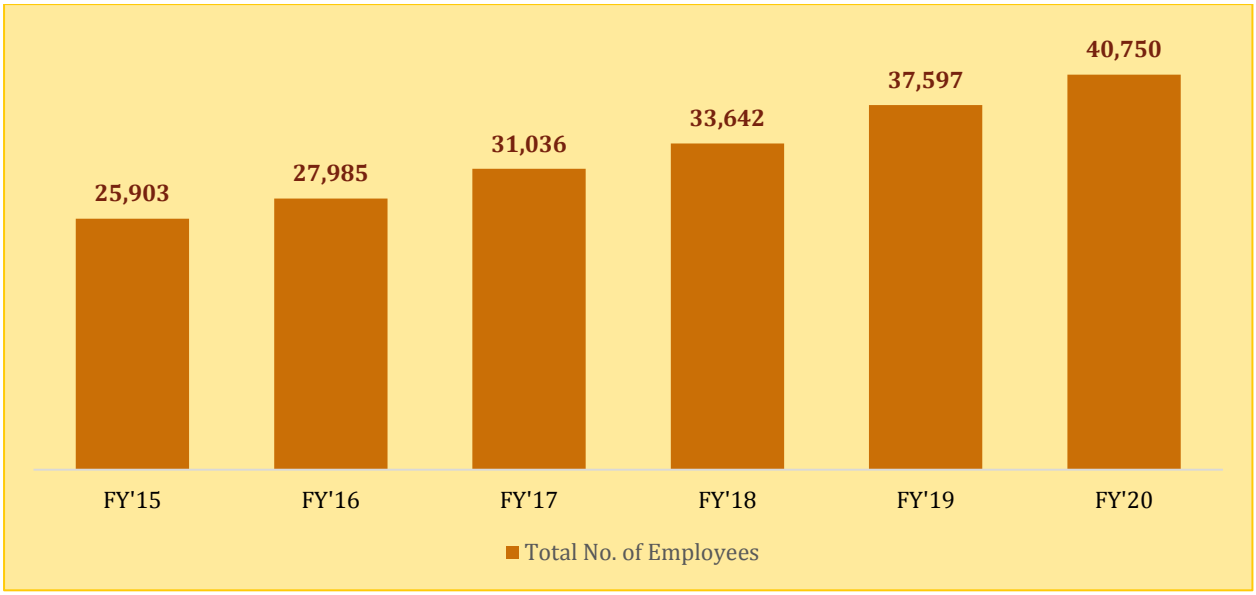


Figure 170: Past Trend of employment in the Spices Industry

Source: Feedback Analysis

Share of Employees (FY' 20) Break by Different Category

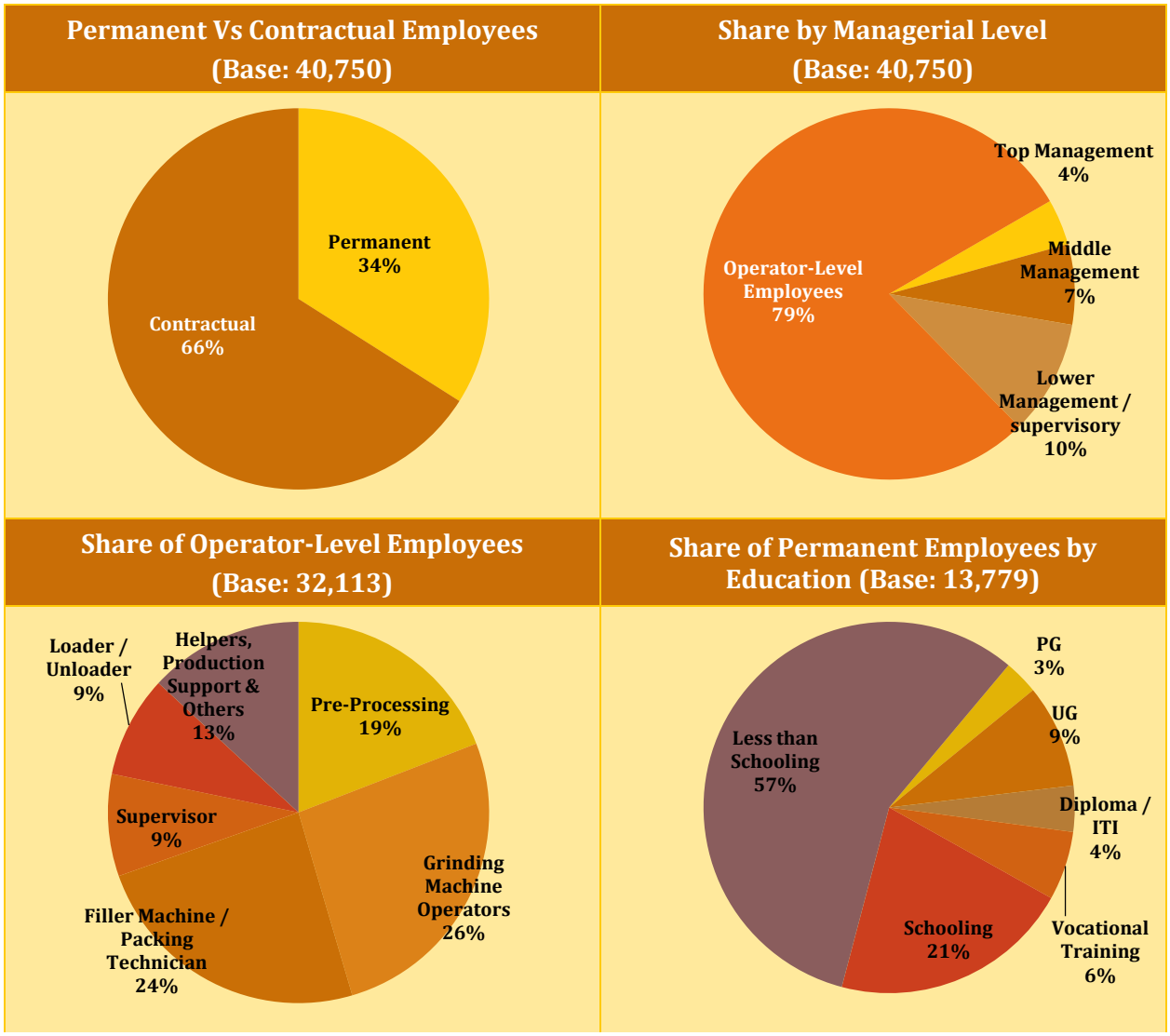


Figure 171: Share of Employees (FY'20): By Different Category

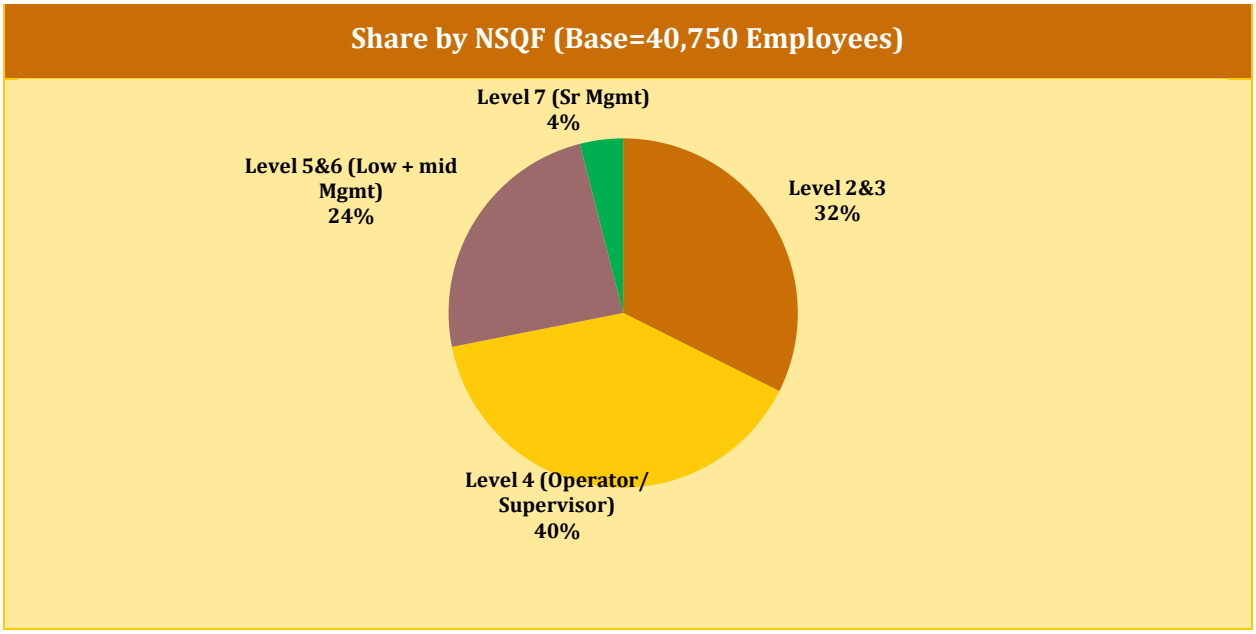


Figure 172: *Share of Employees (FY'20) : By NSQF levels*

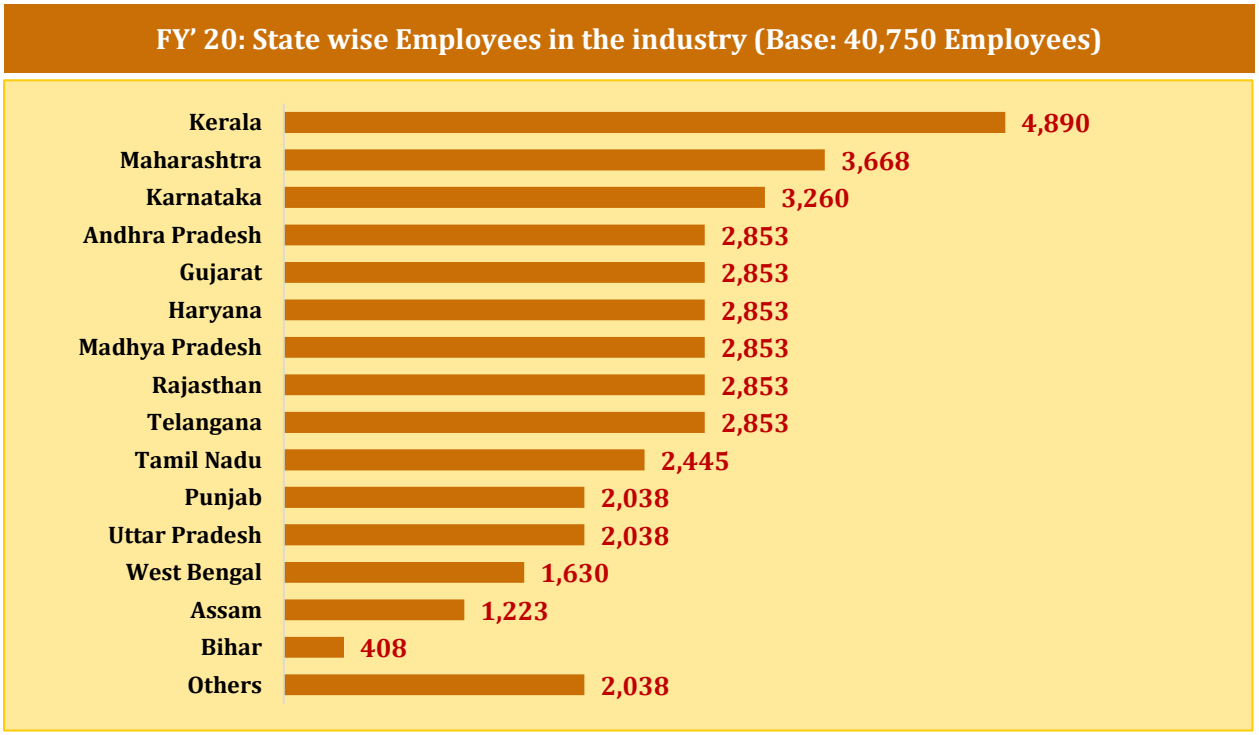


Figure 173: *State wise Employees in the Industry (FY'20)*

Source: Feedback Analysis

Top 15 states account to 95% of total employment in the industry

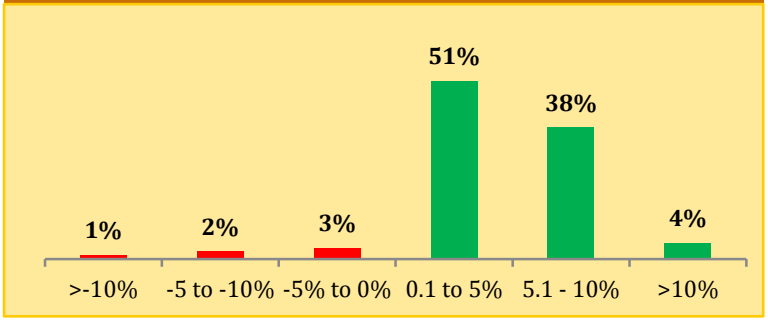
Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	**Pre-Processing Labourer**	The pre-processing work includes primarily grading, sorting and preparation of raw spices (raw materials) for further processing (roasting, drying, etc.). Women comprises of >65% of the labourers among micro, small and medium enterprises.	3	✓	✓	✓	✓
2	**Machine Operator (Processing Machinery)**	Grinding the raw spices and other raw materials using industrial spice grinder or Spices Pulveriser	4	✓	✓	✓	✓
3	**Machine Operator (Filling / Packing Machinery)**	Operating machine or responsible for the spices filling function in the bulk bag container	4			✓	✓
4	**Shift Supervisor**	Monitoring overall operation and managing manpower across functions	5	✓	✓	✓	✓
5	**Helpers**	Misc. work including Cleaning plants, Machinery after every batch, etc.	3	✓	✓		
6	**Loader / Unloader**	Material handling, Loading & Unloading products.	3	✓	✓	✓	✓

Table 143: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

15.3.3 Past Growth of Employees (FY'17 – FY'20)

Past Growth of Employees (FY'17 – FY'20) - %



- **94%** of the small enterprises have indicated that their manpower has **grown** in the past 3 years.
- ~50% have indicated that their manpower has grown marginally (up to 5%).

Figure 174: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

15.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies

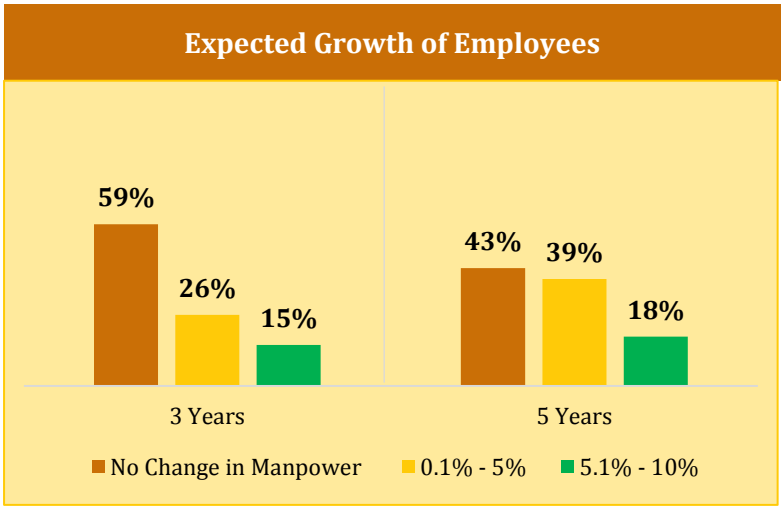
Plans	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises	Overall
Planning to invest in Internet of Things (IoT) or Automation	38%	25%	33%	80%	32%
Plan to invest on new equipment	49%	51%	50%	100%	51%
Plan to enhance the production capacity	58%	39%	50%	80%	50%
Plans to launch new products	34%	39%	43%	100%	38%
Plans to increase exports	17%	23%	43%	100%	23%
Plans to invest on R&D	6%	8%	27%	40%	9%

Table 144: Future Plans of the Companies

Overall, ~50% of the companies do have plans on investment on a new equipment and enhancement of the production capacity.

Automation or IoT; Investment towards Research & Development are predominantly the interest areas of large companies.

Expected Growth in Manpower, Considering the Future Operational Expansion Plans



Considering the future expansion plans, ~40% and 57% of the enterprises who have certain plans for the future are expecting that there would be growth in manpower in future

Figure 175: Manpower Recruitment Plan, Considering the Future Operational Expansion Plans

Source: Feedback Analysis

15.4 Recruitment & Training Practice

Recruitment Practice

Walk-in is the key source of recruiting candidates across Operational level and Lower-level employees. Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Formal training institutes offering food technology / food science programs
Middle Management	• Formal training institutes offering food technology / food science programs
Lower Level Management	• Ameth Business Solutions • The Planet Education • Sunaina Samriddhi • Majority of employees in lower-level management are not coming from any education institutes. Most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 145: Recruitment Practice

Existing employees of the large and medium enterprises do train themselves in training programs offered by Spices Board of India

Training Practice

Overall ~30% of the companies we have covered as part of the sample are providing training across levels when an employee joins the firm (On-the-Job training).

% of Companies offering training

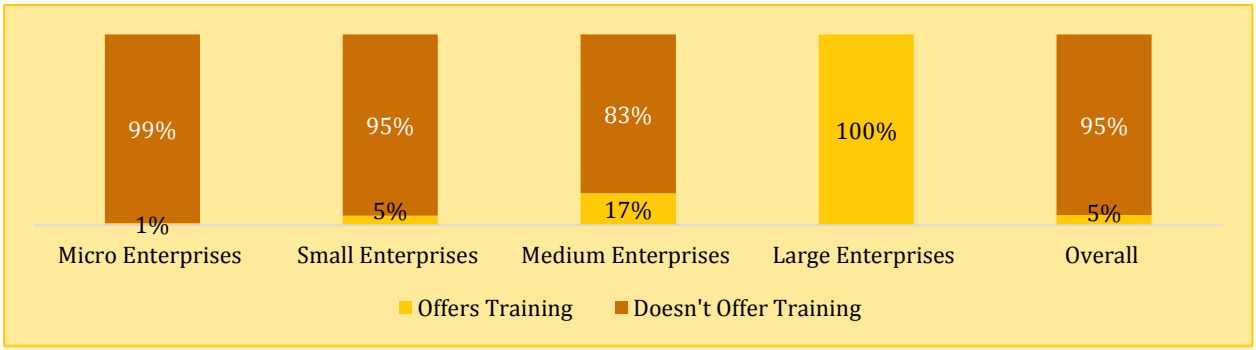


Figure 176: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered (Encountered in Primary Interviews)

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Processing Operations	Sorting; grading the spices and other raw materials and know-how the cleaning process for different type of products	Operator Level Employees & Lower-Level Employees	✓	✓	✓	✓
Raw Spices Handling	Materials handling to reduce wastage	Operator Level Employees	✓	✓	✓	✓
Processing	Operating Machines spice grinder, spices pulveriser	Operator Level Employees & Lower-Level Employees	✓	✓	✓	✓
Operations Management	Training to detail the overall operations, manpower allocation, inspection, etc.	Supervisors / Managers			✓	✓
Supervision of product handling activities	Appropriate packing methods, latest technology, equipment operations, etc.	Supervisors / Managers			✓	✓
Plant Maintenance	Maintenance checklist for equipment (processing and packing)	Operator Level Employees & Lower-Level Employees (Technicians / Machine Operators)				✓
Cleaning	Machine / Drum cleaning; Vehicle tank cleaning before every batch	Operator Level Employees & Lower-Level Employees				✓
Packing	Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio					✓

Table 146: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

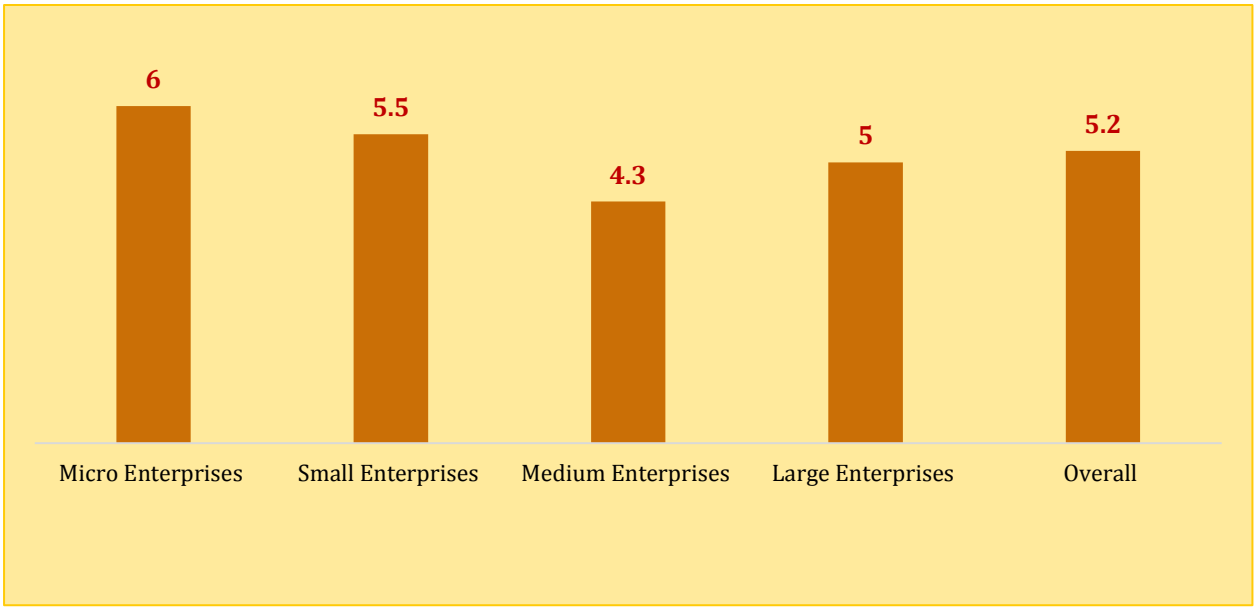


Figure 177: Effectiveness of Training

Source: Feedback Analysis

15.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

Outdated Curriculum and Lack of Practical Training

- The root cause of all the problems is attributed to the education where the curriculum is not focusing on training students who can come into the industry as a subject matter expert since the curriculum does not teach anything about spices or any other technical aspects related to spices or processing of spices in the country.
- Freshers, Interns entering the industry do not have exposure to practical application of the theoretical knowledge gained by students during the course of the program.
- Elementary skills are available in abundance in the market but there are still challenges in operating lab equipment's etc.

Higher Attrition

- The sector is very unorganized and every unorganized sector comes with its own set of challenges like employment is subject to high degree of insecurity
- Hiring fresh candidates from Polytechnic and training them for 2 years is rather challenging especially when there is so much insecurity on employment

Need for Skilled Labour

- As one moves up the ranks, there are major issue with regards to Quality Control where one needs a qualified and knowledgeable person to run the show

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
R&D Manager / Executive	Mid Management NSQF: 5	• New Product Development • Understanding global trends on new products	• Ability to create new products			✓	✓
Plant Manager	Mid Management NSQF: 6	• Managerial Skills • Technical Know-how across functions • Interpersonal Skills • Leadership Skills • Training manpower at the lower level or operator level • Production planning	• Understanding and adaptation to newer technologies • Ability to work with both the processing and packaging equipment	✓	✓	✓	✓
Production Manager	Mid Management NSQF: 6	• Equipment operations (across functions) • Manpower planning for the shifts • Production planning	• Lack of knowledge on equipment maintenance and operations	✓	✓	✓	✓
Quality Control	Mid Management NSQF: 5	• Monitoring the Raw Materials quality • Ingredient's quality check • Assessing the quality for the finished products	• Unable to maintain the similar quality across batches		✓	✓	✓
Inventory Controller &	Mid Management	• To develop inventory management systems, maintain	• Knowledge of inventory		✓	✓	✓

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Transportation Manager	NSQF: 5	stock levels, and coordinate the logistics of orders and transfers.	management software				
Shift Supervisor / Supervisor	Lower-Level Management NSQF: 5	• Overseeing operations including material handling across functions • Soft skills (Communication; Training efficiency & Leadership) • Equipment operations and maintenance	• Best practices w.r.t material handling to reduce wastage during material handling	✓	✓	✓	✓
Maintenance Officer	Lower-Level Management NSQQF: 4	• Knowledge on transformation from analogue to digital business model • Domain Skills	• Lack of update in technology	✓	✓	✓	✓
Loading / Unloading Labors	Operator Level Employees NSQF: 3	• Materials Handling	• Inability to learn and operate across functions • Lack of knowledge on wastage handling	✓	✓	✓	✓
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling • Production support	• Sanitation and Hygienic awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓	✓	

Table 147: Key job roles and their required skills and skill gaps

15.6 Future Projection – Sector & Employment

Projected growth in Grounded & Blended Spices production in India

Based on discussions conducted with the Visionaries and Industry experts, production of grounded and blended spices production likely to reach approx. 1 Mn MT by FY'30. This indicates CAGR of approx. 8.8%. Reasons for such growth are the followings:

- Increasing population of working women and consumers awareness towards adulterate has created a huge demand of blended spices
- Changing preference of Indian consumers towards grounded and blended spices due to higher purchasing power
- There is trend of shifting towards national brands from standard, local and regional brands
- Organized players like Everest, Badshah and MDH are coming up with low-price products in small packaging to give competition to unorganized products.

Future Market & Growth Rate of the Organized sector of Grounded & Blended Spices

Year	Market Size (Rs. Cr.)	Market Size ('000 MT)	Y-o-Y Growth
FY'20	16,800	431	
FY'21 (E)	18,200	467	8.3%
FY'22 (E)	19,700	505	8.2%
FY'23 (E)	21,400	549	8.6%
FY'24 (E)	23,250	596	8.6%
FY'25 (E)	25,300	649	8.8%
FY'26 (E)	27,500	705	8.7%
FY'27 (E)	29,900	767	8.7%
FY'28 (E)	32,600	836	9.0%
FY'29 (E)	35,600	913	9.2%
FY'30 (E)	39,000	1,000	9.6%

Table 148: Future Market & Growth Rate of the Organized sector of Grounded & Blended Spices

Source: Interactions with SMEs & Visionaries

Future trends and likely share of the Organized sector (Grounded & Blended Spices)

Year	Market Size ('000 MT)	Share of Organized Sector*	Organized sector (Rs. Cr.)
FY'20	431	43%	185
FY'21 (E)	467	44%	201
FY'22 (E)	505	45%	227
FY'23 (E)	549	47%	258
FY'24 (E)	596	49%	292

Year	Market Size ('000 MT)	Share of Organized Sector*	Organized sector (Rs. Cr.)
FY'25 (E)	649	51%	331
FY'26 (E)	705	53%	374
FY'27 (E)	767	55%	422
FY'28 (E)	836	57%	476
FY'29 (E)	913	60%	548
FY'30 (E)	1,000	62%	620

Table 149: Future trends and share of the Organized sector (Grounded & Blended Spices)

**Note: Spices Board of India, visionaries, industry experts and SMEs feel that share of Organized sector likely to reach to approx. 62% by FY'30 from 43% in FY20.*

Innovation in the new products

- As the spices powder category is getting mature, Indian players are innovating with new hyper localized spice mix categories (e.g., Konaseema Kodi Koora Masala, Madurai Sambar Powder, Shahi Garam Masala).
- Also, organized players are exporting global spice flavours (e.g., Ching's Secret). Introduction of different flavours in sectors like RTE/RTC, Snacks / Namkeens, Spice flavours in Dairy Products, nutraceutical products etc.

Government Initiatives

The Government of India through its body Spices Board of India, is also propelling aggressively to export the Indian spices to gain the market share and market value prominently with the help of promotions and branding during international fairs. Around 1 – 1.5 billion kgs of total spices have been exported by India every year[52].

Spices Board provides financial assistance to exporters for infrastructure development, trade promotion including participation in international fairs, product development & research, spice processing in North East region, promotion of India spice brands and certification of Spice Houses.

The spice industry is expected to benefit from the package announced for the MSME units as well as from the package for the agriculture sector. Sub-components like 'formalization & global outreach of micro food enterprises', 'farm-gate infrastructure development' and 'promotion of herbal cultivation' are beneficial to the sector.

Processing capacity and investment required in the Organized sector (Grounded & Blended Spices)

Parameter	Unit	Values
FY'20 Production	'000 MT	185
FY'30 Production (E)	'000 MT	620
Increase in production between FY'20 & FY'30	'000 MT	435

[52] *https://www.researchgate.net/publication/334771417_Export_potential_of_spices_and_its_value_added_*

Parameter	Unit	Values
Considering 80% capacity utilization, additional processing capacity required	'000 MT	543
Investment norm	Rs. / MT	3,00,000
Total Investment required	**Rs. Cr.**	**16,304**

Table 150: Processing capacity and investment required in the Organized sector

Source: Spices Board of India

Spices Board has established eight spice parks in major production centres by setting up common infrastructure facilities for cleaning, grading, processing, packing, value addition and storage. The parks are primarily intended to provide for quality improvement and value addition of spices and to help the spice farmers/ farmers groups in shortening the supply chain by facilitating direct linkage with exporters/processors.

The Spices Board will set up Spices Parks at Kota in Rajasthan and Rae Barely in UP. The Board has already set up Spices Park at Chhindwara in Madhya Pradesh, Puttady in Kerala, Jodhpur in Rajasthan, Guna in Madhya Pradesh, Sivaganga in Tamil Nadu and Guntur in Andhra Pradesh.

The Rajasthan government has allotted 30 acres at Ramganj Mandi in Kota free of cost to the Board for the purpose. The Park is meant for processing and value addition of seed spices, especially for coriander and cumin. The Board had allotted 14 acres to 12 spices exporters for developing their own processing units. The UP government has allotted 11 acres. It will produce mint and mint products.

Select ongoing and upcoming projects in Indian Grounded & Blended Spices sector[5]

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Om Oil & Flour Mills Ltd.	Spices (Ramdaspur) Project	Cuttack, Odisha	New Unit	100
2	Jain Irrigation Systems Ltd.	Spices (Walkhed) Project - Expansion	Nashik, Maharashtra	Capacity Expansion	40
3	Government Of Telangana	Nizamabad Turmeric Spice Park Project	Nizamabad, Telangana	New Unit	31
4	Food Karnataka Ltd.	Byadagi Spice Park Project	Haveri, Karnataka	New Unit	29
5	Telangana State Spice Processing Unit	Spices Processing (Doolapally) Project	Ranga Reddy, Telangana	New Unit	26

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
6	Eastern Condiments Pvt. Ltd.	Lucknow Spices and Condiments Plant Project	Lucknow, Uttar Pradesh	New Unit	20
7	Kerala Industrial Infrastructure Devp. Corpn. Ltd.	Thodupuzha Spices Processing Cluster Project	Idukki, Kerala	New Unit	20
8	Spices Board of India	Spices Park (Sadar)	Rae Bareilly, Uttar Pradesh	New Unit	19
9	Lama Bear Organic Extract Ltd.	Spice Oil (Madhura) Project	Madhura, Bihar	New Unit	19
10	Eastern Condiments Pvt. Ltd.	Dharwad Spices and Condiments Plant (Phase 1) Project	Dharwad, Karnataka	New Unit	15
11	Spices Board of India	Spices Exporters Entrepreneurship Facility (Banglore)	Bangalore, Karnataka	New Unit	9
12	Lenyadri Masale	Spices (Pimpalgaon Baswant) Project - Expansion	Nashik, Maharashtra	Capacity Expansion	5

Table 151: *Select ongoing and upcoming projects in Indian Grounded & Blended Spices sector*

Source: CMIE & Projects Today

FY'20 employment estimation in Grounded & Blended Spices industry in India (Organized Sector)

Company Category	Average no. of Employees	Total No. of Employees in Processing	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Large Enterprises	1,350	10,800	30%	56	5.1
Medium Enterprises	180	9,900	24%	44	4.5
Small Enterprises	35	12,250	29%	54	4.4
Micro Enterprises	12	7,800	17%	31	4.0

Company Category	Average no. of Employees	Total No. of Employees in Processing	Production Share*	Production ('000 MT)	Annual Production/ Employee (MT)
Total		**40,750**		**185**	**4.5**

Table 152: FY'20 employment estimation in Grounded & Blended Spices industry in India (Organized Sector)

**Discussion with the Spice Processors and SMEs*

Note: Large Enterprises are pan India players that process various types of blended masala categories with overall revenue of > Rs. 250 Cr. Medium-Sized Enterprises are predominantly regional manufacturers with revenue of Rs. 50 Cr - 250 Cr. Small enterprises primarily process Pure & Traditional Spices, Meat Masala and Ready to Prepare Masalas. many Small enterprises also take up contract manufacturing jobs from the large enterprises. Revenue range for this category is Rs. 5 Cr. - 50 Cr. Micro enterprises are into blending or processing of primarily Traditional Spices with revenue of < Rs. 5 Cr.

Future employment projection in Grounded & Blended Spices industry in India (Organized Sector)

Company Category	FY'30 share in Production*	FY'30 Production ('000 MT)	Annual Production/ Employee (MT)#	FY'30 Total Employee Estimation	FY'20 - FY'30 Employment Generation potential
Large Enterprises	30%	186	5.4	34,471	23,671
Medium Enterprises	24%	149	4.5	33,178	23,278
Small Enterprises	29%	180	4.4	41,054	28,804
Micro Enterprises	17%	105	4.0	26,141	18,341
Total		**620**	**4.6**	**134,844**	**94,094**

Table 153: Future employment projection in Grounded & Blended Spices industry in India

**As per discussion with the Spice Processors and SMEs, contribution of various types of companies in the Grounded & Blended Spices industry will remain same over next 10 years*

 # Based on discussions with equipment manufacturers, processing companies, industry experts and SMEs, large and some of the medium and small enterprises will adopt automation / industry 4.0 in the coming years. As per equipment manufacturers, this may lead to 5% improve in the productivity for large enterprises and 2% improvement in the productivity of the employees in medium and small enterprises. It is estimated that micro enterprises likely to have current productivity level in future as well. The same has been considered for calculating future employment generation potential.

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category

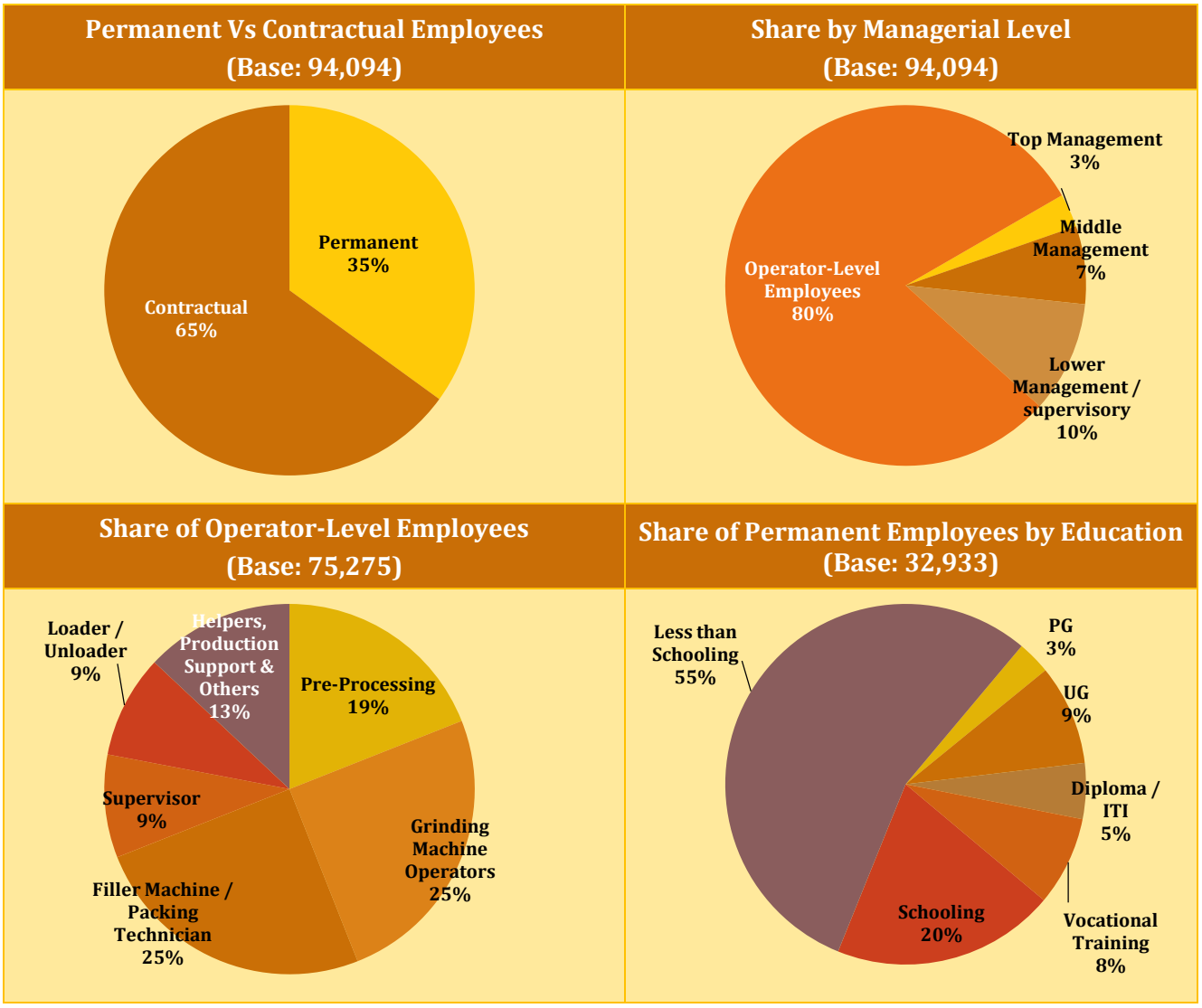


Figure 178: Share of FY'20 - FY'30 Employment Generation potential: By Different Category

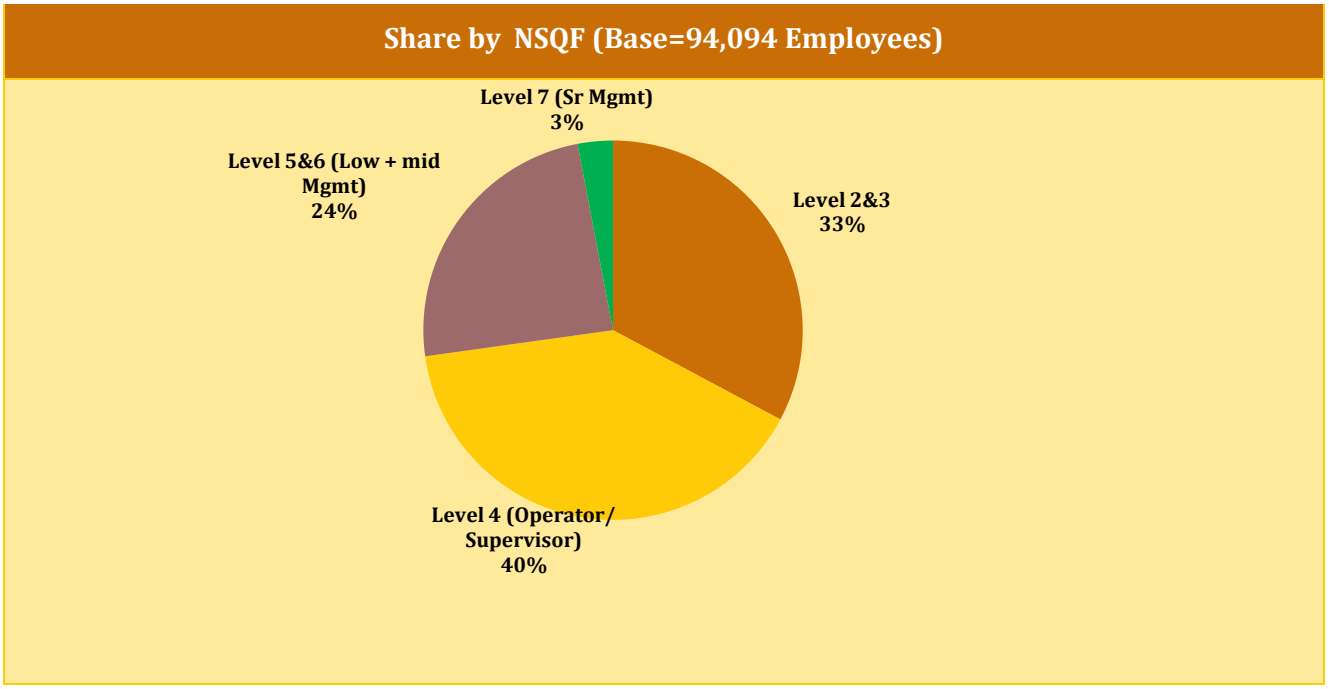


Figure 179: Share of FY'20 - FY'30 Employment Generation potential: By NSQF levels

Source: Feedback Analysis

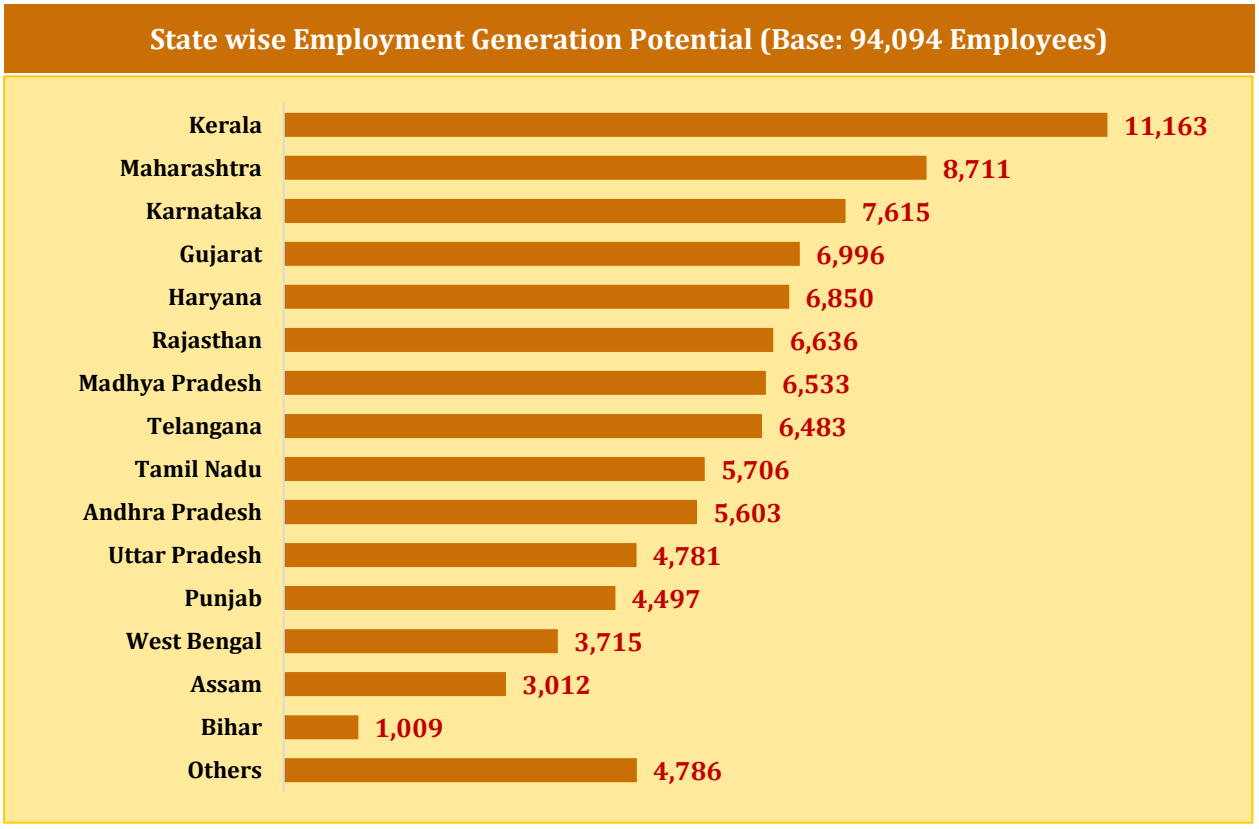


Figure 180: State wise Employment Generation Potential

Source: Feedback Analysis

Top 15 states account to 95% of total employment in the industry

15.7 Existing & Emerging Prominent Job Roles Which Requires Skilling

The following table outlines the specific existing and emerging prominent job roles that will create employment opportunities in spices Processing Sub-sector in future:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.	✓	✓	✓	✓
Grader & Sorter	3	A Grader & Sorter is responsible for carrying out various labor-intensive activities such as grading and storing the supplies under supervision.	**A Grader & Sorter must be able to:** • Load and unload supplies • Maintain cleanliness in the work area and storage area • Store the supplies appropriately • Pack the products as per the packaging standards **A Grader & Sorter must know and understand:**	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			• Applicable food safety and hygiene standards • Appropriate handling of food supplies and products				
Grinding & Blending Machine Operator	4	A Grinding & Blending Machine Operator is responsible for preparing and operating processing machineries such as spice grinder, spice pulveriser etc. The person is also responsible for the general maintenance of various machineries.	**A Grinding & Blending Machine Operator must be able to:** • Prepare the work area and machineries for processing spices • Operate the spice processing machineries • Perform general maintenance of the machineries **A Grinding & Blending Machine Operator must know and understand:** • Use of different types of machineries used in spice processing plant such as spice grinder, spice pulveriser etc. • How to perform general maintenance of the machineries	✓	✓	✓	✓
Pouch Packaging Machine Operator	4	A Pouch Packaging Machine Operator is responsible for preparing the work area and packaging machineries; operating the packaging machineries and performing general maintenance of	**A Pouch Packaging Machine Operator must be able to:** • Maintain cleanliness in the work area • Prepare filling and sealing equipment • Operate and maintain the Pouch Packaging machine along with filling and sealing equipment	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		the packaging machineries.	**A Pouch Packaging Machine Operator must know and understand:** • Use of different types of equipment used for packaging spices • General maintenance of various packaging equipment				
Spice Plant Supervisor	5	A Spice Plant Supervisor is responsible for monitoring the daily operations of the plant and ensuring that work is carried out in an effective and timely manner by allocating tasks to workers.	**A Spice Plant Supervisor must be able to:** • Assign tasks to the processing unit workers • Check work progress to ensure timely completion • Identify and resolve work related problems • Manage and train workers • Monitor and check equipment and system for the correct functioning • Supervise the repair and maintenance activities **A Spice Plant Supervisor must know and understand:** • Effective supervision practices to ensure timely completion of tasks • Complete domain knowledge across functions	✓	✓	✓	✓
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data				
Food Safety & Hygiene Manager	6	A Food Safety & Hygiene Manager is responsible for implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that	**A Food Safety & Hygiene Manager must be able to:** • Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		products meet the applicable quality standards; educating suppliers; and conducting safety audits.	• Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.				
Steam Sterilisation Machine Operator	4	A Stream Sterilisation Machine Operator is responsible for preparing the machine for use and operating it for sterilising food items. The individual regulates the steam pressure and temperature during the sterilisation process. The person also packs the sterilised food items and carries out regular repair and maintenance of the food stream sterilisation machine/ autoclave.	**A Steam Sterilisation Machine Operator must be able to:** • Prepare the food stream sterilisation machine/ autoclave for use Load food items in the food stream sterilisation machine/ autoclave for sterilization • Monitor and maintain the recommended steam pressure and temperature during the sterilisation process Pack the sterilised food items in appropriate packing material such as cans, glass, jars, protecting it from contamination • Carry out regular repair and maintenance of food stream sterilisation machine/ autoclave Follow the applicable food hygiene, and health and safety standards		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			A Steam Sterilisation Machine Operator must know and understand: • How to calibrate the food stream sterilisation machine/ autoclave for use • How to operate the food stream sterilisation machine/ autoclave Relevant temperature and pressure to maintained during food sterilisation process • How to carry out regular repair and maintenance of food sterilisation machine/ autoclave Applicable food hygiene, and health and safety standards				
Cryogenic Grinding Machine Operator	4	A Cryogenic Grinding Machine Operator is responsible for setting up the machine for use and operating it to carry out cryomilling or freezer milling as per the requirement. The individual monitors and maintains the relevant machine parameters during its operation to ensure compliance with the applicable quality standards with respect to	**A Cryogenic Grinding Machine Operator must be able to:** • Calibrate the cryogenic grinding machine for use according to the food items to be ground Load food items in the cryogenic grinding for cryomilling or freezer milling • Monitor and regulate the relevant machine parameters during the grinding process • Check the quality of ground food items to ensure compliance with the applicable quality parameters			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		the quality of ground food items. The person also and carries out regular repair and maintenance of the cryogenic grinding machine.	• Pack the ground food items in appropriate packing material • Carry out regular repair and maintenance of cryogenic grinding machine • Follow the applicable food hygiene, and health and safety standards **A Cryogenic Grinding Machine Operator must know and understand:** • Applicable food hygiene, and health and safety standards • How to prepare a cryogenic grinding machine for use and operate it to carry out cryomilling or freezer milling • Relevant machine parameters to be monitored and maintained during the grinding process • How to carry out regular repair and maintenance of cryogenic grinding machine				

Table 154: Existing and emerging prominent job roles which will require skilling

Skill Sets required across multiple levels in the sector

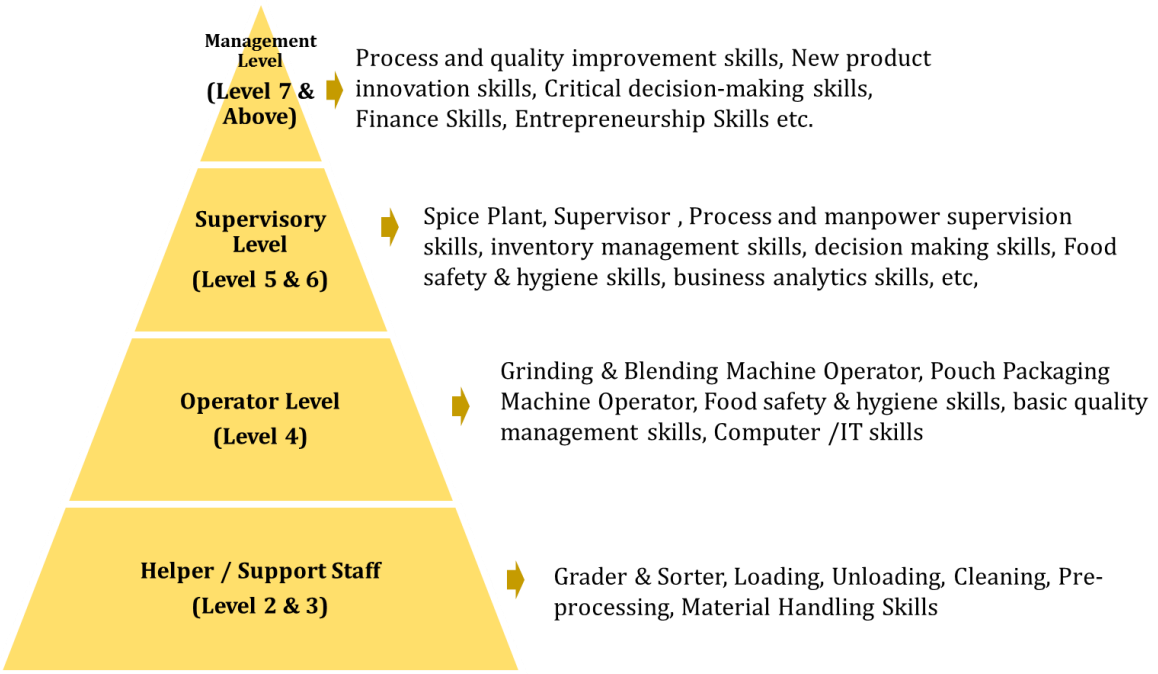


Figure 181: Skill Sets required across multiple levels in the sector

15.8 Expectations from the Industry Stakeholders

Technology Increases the Productivity & Manpower

- There is a tremendous scope for increase in skilled manpower considering the developments in Indian market. The developments are in terms of technology which has increased the productivity which in turn increase the scope for increase in manpower.
- Industry 4.0 gives the results based on various sensors installed in the system related to productivity per shift; idle machine time and idle manpower; etc. which would allow companies to take corrective measure to increase the productivity. Higher the productivity, more the manpower required.
- Currently the plant automation and advanced technology are being implemented by the large companies. Certain incentives for small and medium enterprises will definitely boost the implementation for the benefit of the industry.

Inclusion of curriculum / specialization on spice processing among Formal Education

- Among formal education, there are no specialization for spices and also there are no curriculum focused on spice processing.
- Processing companies are willing to assist institutes for framing curriculum. The key expectations among these companies are to identify the institutes in major states like Kerala to introduce such programs or specializations.

Visibility of In-formal Training Institutes offering Training Programs for Spice Industry

- As of now, spice processing technician is the only QP offered by FICSI which is specific to Spice Industry. The challenge here in the sector is the limited awareness of such program offering or the institutes offering spice processing technician and related vocational training programs
- There should be an effort to showcases the training being offered for the sector and more such institutes to be operated across key states / clusters.

Higher Emphasis on Food Safety & Hygiene Related Programs

- Prospective workers also need to be trained on how to handle these spices and the steps involved in food processing
- The food safety may be the first and foremost concept for the Government to give training to each and every person.
- It becomes extremely important to sensitize employees on the importance of maintaining stringent hygiene standards. This is one area where the government needs to lay a lot of emphasis on across food processing sectors.

Chapter 16: Sub-Sectoral Analysis - Cold Chain

16.1 Market summary

Cold chains impart storage and distribution services for products that must be maintained at a given temperature. The cold chain comprises of the following 3 segments - First-mile Equipment (Pack houses for F&V, Bulk Milk Coolers for Dairy, etc.), Cold Storages (Warehouses / Distribution Centre / Tertiary Cold Rooms) & refrigerated Transportation (First mile vehicle, Intercity long distance, Intracity small vehicle multi-point deliveries). The refrigerated transportation system is still in the nascent stage in India. Cold Storage is an enabling sector and requirement of Cold Storage will depend on growth of some of the key Processing sectors such as Dairy, Fruits & Vegetables, Meat & Poultry, RTE/RTC and Fish & Sea Foods. EXIM-focused commodities occupy 65-70% of cold storage across the country. This is due to stringent quality requirements in the countries they are exported to, which necessitates temperature-controlled storages and use of reefers across the value chain. It is also estimated that the average capacity utilization in cold storage is around 75% - showing sustainability of the cold chain business in India.

Key Industry Indicators	Details
Cold Storage Requirement ('000 MT) (FY' 20)	33,059
No. of units (Cold storage, Pack houses & Refer trucks)	7,600
Past Growth rate (CAGR) (FY' 15 – FY' 20)	3%
Total Number of Employees (FY' 20)	2,24,300 nos.
Expected Cold Storage Requirement ('000 MT) FY' 2030	105,222
Future growth rate (FY' 20 – FY' 30)	7%
Total Employee Estimation (FY' 30)	296,038 nos.
Overall Employment Additions (FY' 20 – FY' 30)	71,738 nos.

Table 155: Cold Chain : Key Industry Indicators

16.2 Present State of the Industry & Future Outlook

Cold chains impart storage and distribution services for products that have to be maintained at a given temperature. India is currently the world's largest producer of milk, the second-largest producer of fruits and vegetables and has a substantial production of marine, meat and poultry products.

Most of these products are temperature sensitive and require specific temperature ranges to be stored and transported. This has resulted in the establishment of a very large cold chain infrastructure in the country.

The cold chain comprises of the following 3 segments

1. First-mile Equipment (Pack houses for F&V, Bulk Milk Coolers for Dairy, etc.)
2. Cold Storages (Warehouses / Distribution Centre / Tertiary Cold Rooms)

3. Refrigerated Transportation (First mile vehicle, Intercity long distance, Intracity small vehicle multi-point deliveries)

Key Cold Chain Service Providers

North	SNOWMAN, TCI Supply Chain Solutions, KCS, InSynergy, Frozen Delight, Agility, TRIDENT, IRC GROUP, Coldrush Logistics, mr. KOOL, Prakash, bigbasket
South	SNOWMAN, Coldrush Logistics, FSC, tps, tropicana, TVS, bigbasket, GATI KAUSAR Cold Chain Solutions, Unext, COLD CHAIN SOLUTIONS, COLD CARE GROUP, ProConnect Integrated Logistics, COLDMAN
East	SNOWMAN, Crystal, TVS Supply Chain Solutions, BSR TEAM We Delivered Smiles, Shalimar Group, FSC, bigbasket
West	SNOWMAN, COLDMAN Warehousing & Distribution, STELLER, KATSON LOGISTICS, ColdStar, bigbasket, Crystal, schedulers, KOTAK GLOBAL LOGISTICS, Coldrush Logistics, BROEKMAN LOGISTICS, SWIFT COLD CHAIN GROUP
Central	Coldrush Logistics, NG NARANG GROUP More than four decades of commitment for preserving freshness, ColdEX, COLDMAN Warehousing & Distribution, bigbasket
North East	COLDMAN Warehousing & Distribution, bigbasket

Figure 182: *Key Cold Chain Service Providers*

Universe Estimation

Estimated No. of Cold Chain Service Providers

The cold chain industry comprises around 7,500 – 8,000 companies across categories.

Around 30% of these companies are in Uttar Pradesh, followed by 12% in Gujarat. Punjab and Maharashtra accounts for 9% and 8% respectively. Together these top 4 states account for 57% of companies

Other prominent states are West Bengal, Haryana and Karnataka.

First-Mile Equipment

There are different First-Mile Equipment used across sub-sectors. Major sub-sectors where the first mile equipment required are Dairy, F&V, Meat & Poultry Processing and Fish & Seafood Processing

Sub-Sector	First-Mile Equipment	No. of Equipment
Dairy Products	Bulk Milk Coolers[53]	• It is estimated that Installed base of the BMCs in India could be around 50,000 – 52,000
Fruits & Vegetable	Pack Houses[54]	• 207 APEDA approved active packhouses (as of January 2021) • 72% of the APEDA approved packhouses are located in Maharashtra • Apart from APEDA approved packhouses, there are another 200 packhouses in the Private Sector
Meat & Poultry	Meat Cooler Box	• Highly unorganized
Fish & Seafood	Isolated Insulated Box (Ice Box)	• Highly unorganized

Table 156: First-Mile Equipment used across sub-sectors

Cold Storages

The top 8 states (UP, WB, Gujarat, Punjab, AP & Telangana, Bihar, MP & Maharashtra) holds 86% of the total capacity and 76% in terms of the number of cold storages. Around 40% of the cold storages have a capacity below 1000 metric tonnes

[53] Feedback BOK & Primary Research
[54] APEDA

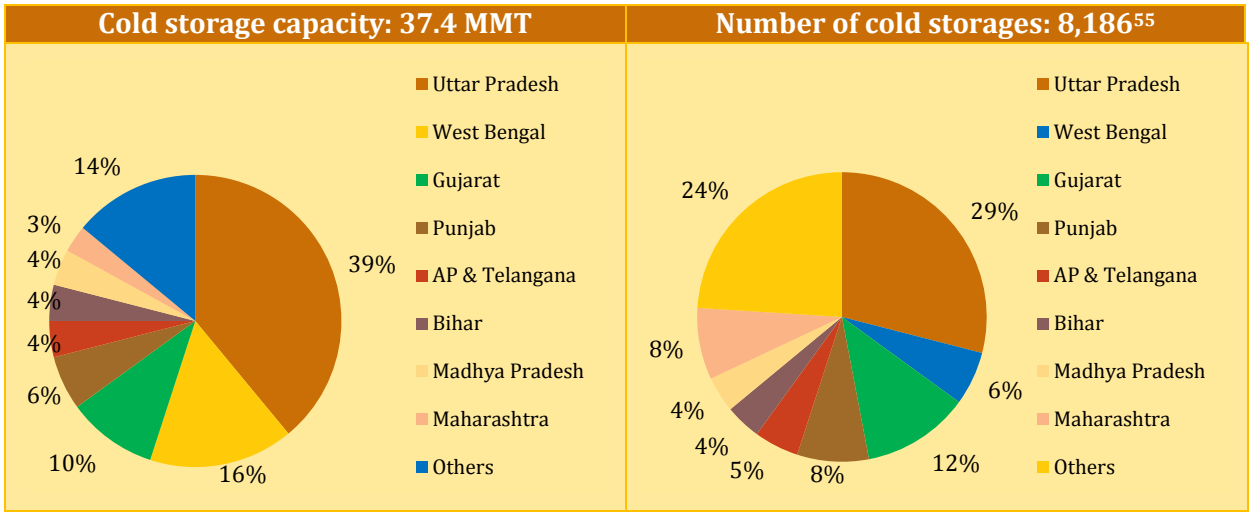


Figure 183: *Cold storage capacity : By State*

Figure 184: *Number of cold storages: By State*

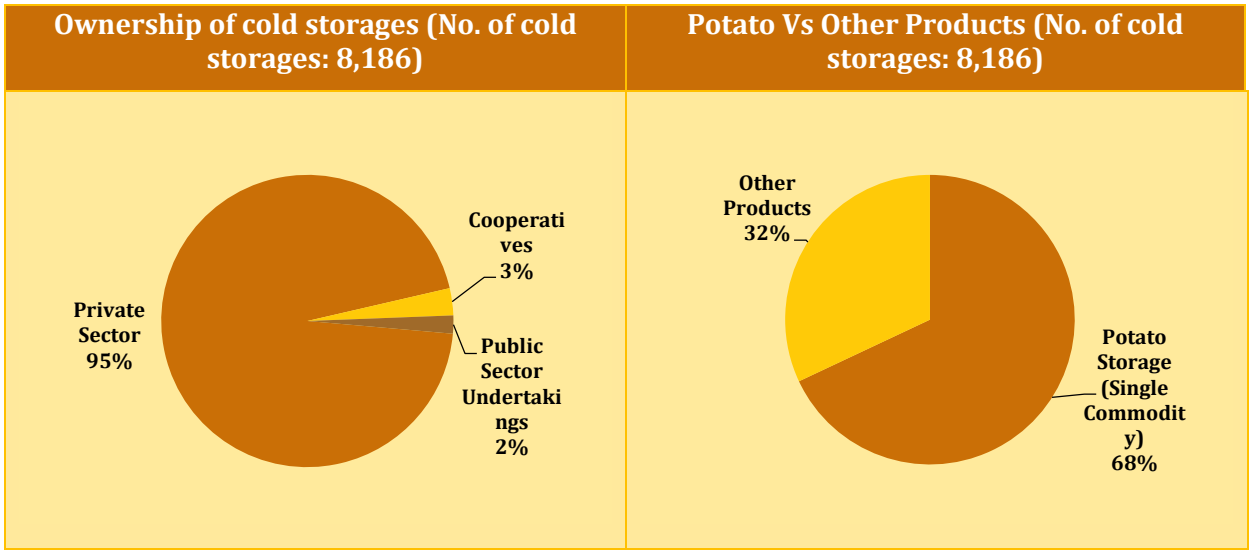


Figure 185: Number of cold storages: By Ownership

Figure 186: Number of cold storages: By Potato Vs. Other products

Apart from potato, the multi commodity cold storages cater to meat & poultry, seafood, dairy products, fruits & vegetables and pharmaceuticals.

EXIM-focused commodities occupy 65-70% of cold storage across the country. This is due to stringent quality requirements in the countries they are exported to, which necessitates temperature-controlled storages and use of reefers across the value chain.

It is also estimated that the average capacity utilization in cold storage is around 75% - showing sustainability of the cold chain business in India.

[55] https://agritimes.co.in/horticulture/india-has-8186-cold-storages-facilities-with-a-capacity-of-37-42-million-tonnes

Geographies for Cold Chain Interventions in India

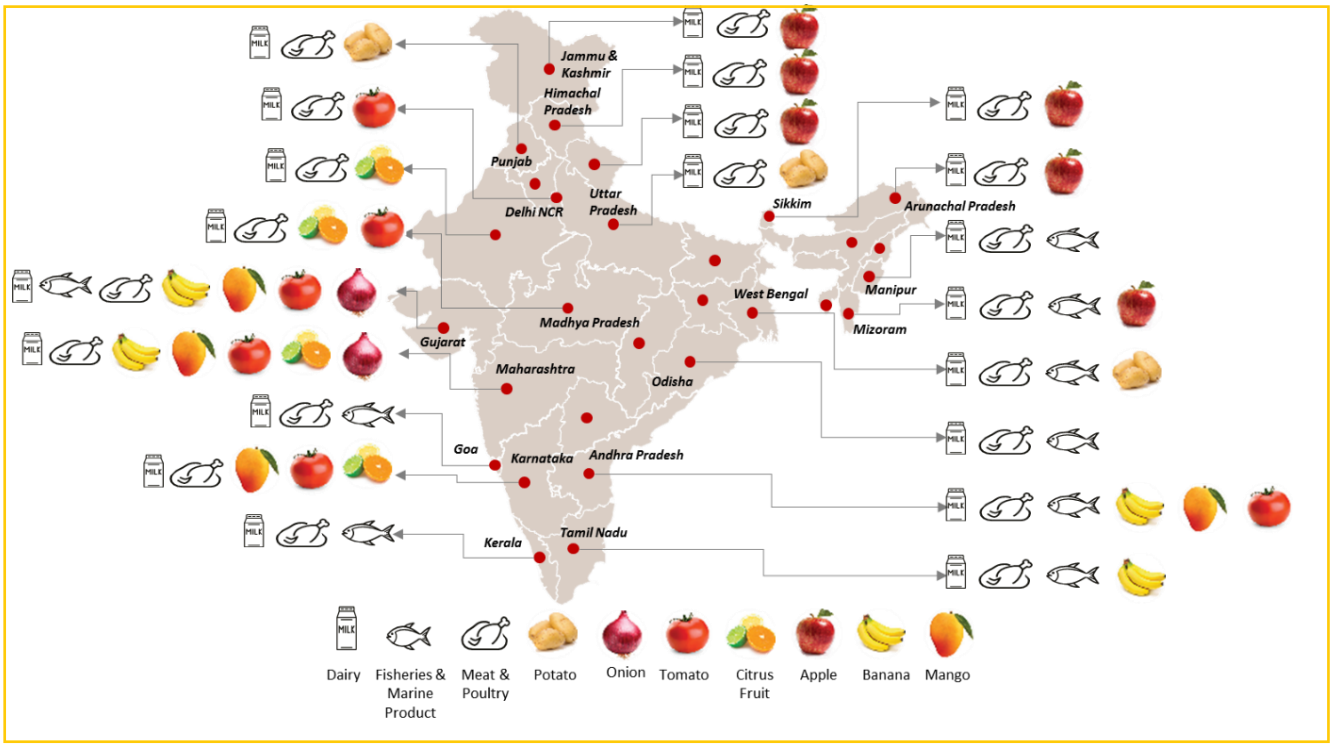


Figure 187: Geographies for Cold Chain Interventions in India

Cold Chain Clusters in India

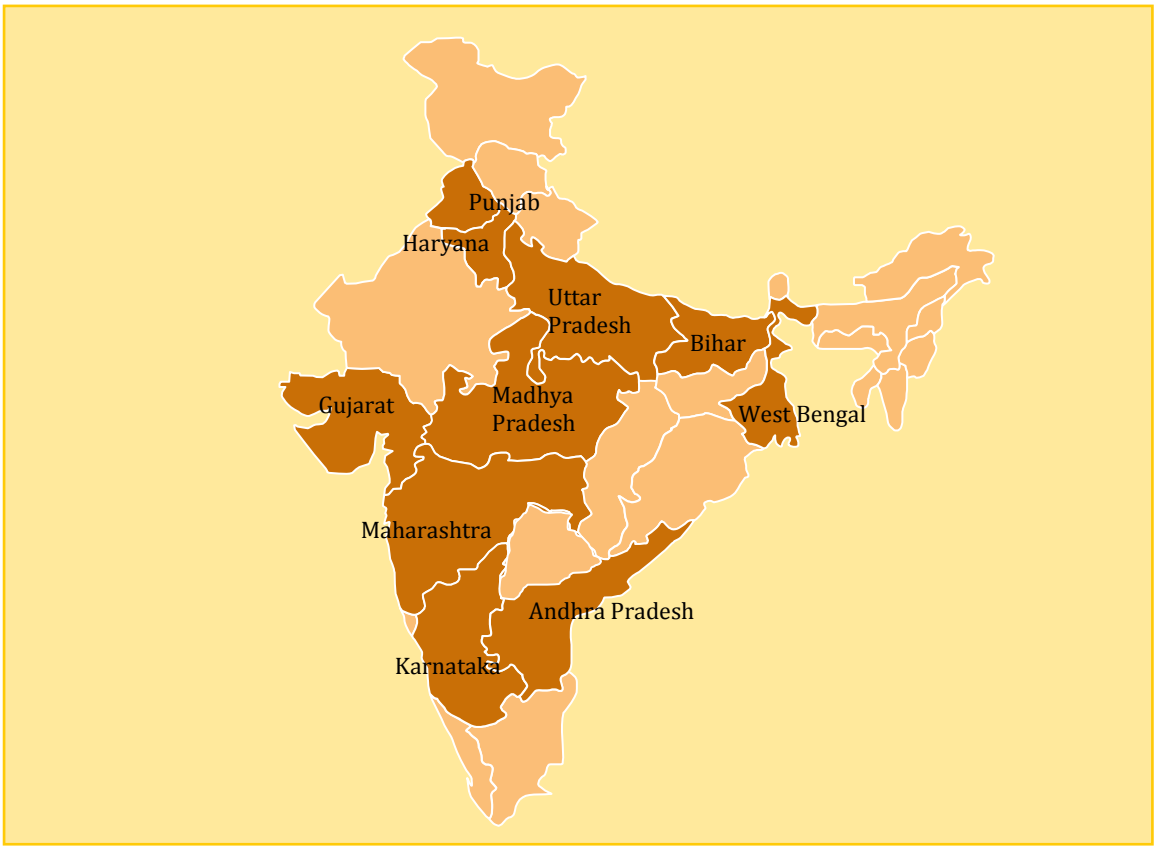


Figure 188: Cold Chain Clusters in India

Top 10 states account to 83% of total employment in the Cold Chain industry

Historical growth in Cold Storage installed base in India

Year	Capacity ('MMT)	No. of Cold storages	Addition in Cold Storage capacity in India (MMT)	Addition in no. of Cold Storages in India
FY'15	31.82	7,000		
FY'16	34.05	7,395	2.23	395
FY'17	34.67	7,543	0.62	148
FY'18	36.22	7,916	1.55	373
FY'19	37.26	8,154	1.04	238
FY'20	37.40	8,186	0.14	32

Table 157: Historical growth in Cold Storage installed base in India

Refrigerated Transportation

The refrigerated transportation system is still in the nascent stage in India. Refrigerated transportation includes of First mile vehicle, Intercity long distance and Intracity small vehicle multi-point deliveries. Around 300 players are operating with 18,000 reefer vehicles in India[56]. Around 25 – 30 players are national players while the rest of the players are unorganized regional players.

Major Products	Mode of Refrigerated Transportation	
	Manufacturer to Warehouse	Warehouse to Distributor / Seller
Milk	PUF Vehicles	Insulated Vans
Butter, cheese, curd, cream, chocolates	Reefer Vehicles	Reefer, insulated containers, insulated vans
Ice cream and fast food	Reefer Vehicles	Reefer vehicles, shipper boxes, freezer on wheel
Frozen meat, seafood, processed meat, and poultry & processed vegetables	Reefer Vehicles	Reefer vehicles, AC vehicles, shipper boxes
Fruits, vegetables & horticulture	Reefer Vehicles	Limited Usage of Reefer Vehicles and other relevant infrastructures

Table 158: Mode of Refrigerated Transportation

Refrigerated Transportation can be anywhere between 3 hours to 7 days. While duration for Long Haul Vehicles (Inter City) can be between 4 days and 7 days, the Short Haul Vehicles (Inter City) transportation is around 12 hours to 24 Hours. Intracity small vehicle with multi-point deliveries transportation can be between 3 hours and 6 hours

[56] Sources: Primary Research with the Refrigerated Transportation Service Providers

Current installed base for Pack Houses and Reefer Trucks in India

Year FY'20	Installed Base (Nos.)
Pack Houses	400
Reefer Trucks	18,000

Table 159: Current installed base for Pack Houses and Reefer Trucks in India

Note: out of 400 Pack Houses, 205 are registered with APEDA and the remaining Pack Houses are operated by Private players.

16.3 Present Employment Scenario & Analysis

16.3.1 Sample Coverage by Categories of Companies & Region

Category of the Company	Sample Coverage (N)	East	North	West	South
Micro Enterprises	**73**	**7%**	**45%**	**21%**	**27%**
Small Enterprises	**67**	**12%**	**37%**	**24%**	**27%**
Medium Enterprises	**16**	**38%**	**-**	**13%**	**50%**
Large Enterprises	**15**	**20%**	**33%**	**27%**	**20%**
Total	**171**	**12%**	**37%**	**22%**	**29%**

Table 160: Sample Coverage by Categories of Companies & Region

16.3.2 Total No. of Employees

Past Trend of employment in the Cold Chain Industry

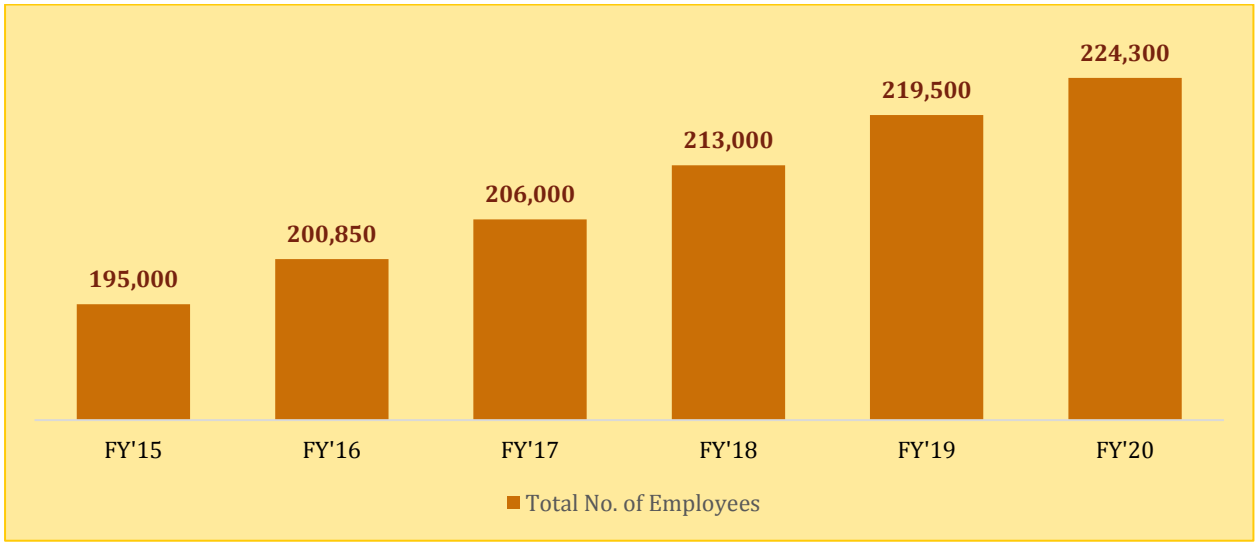


Figure 189: Past Trend of employment in the Cold Chain Industry

Source: Feedback Analysis

Share of Employees (FY' 20) Break by Different Category (Organized Segment)

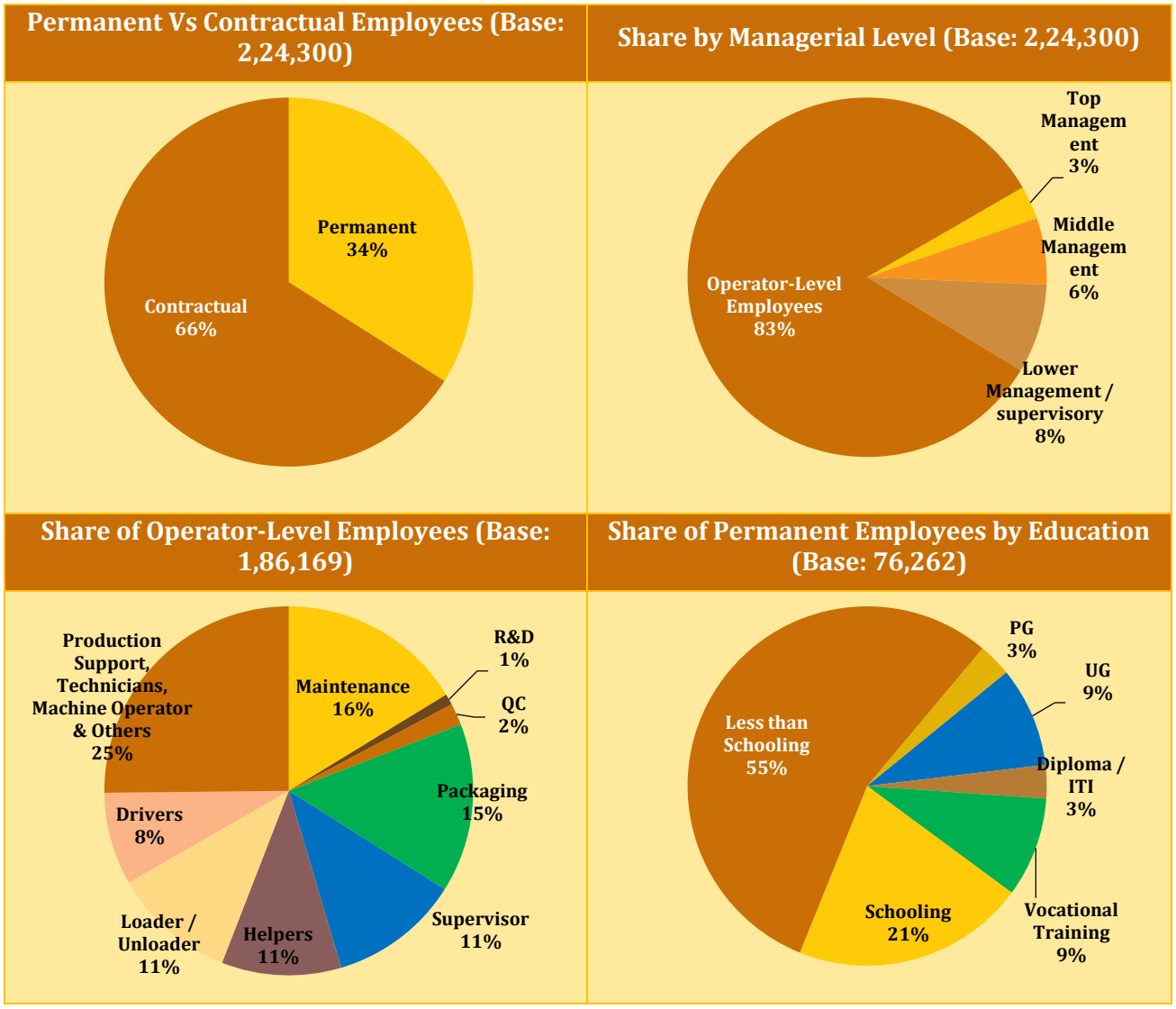


Figure 190: Share of Employees (FY'20): By Different Category

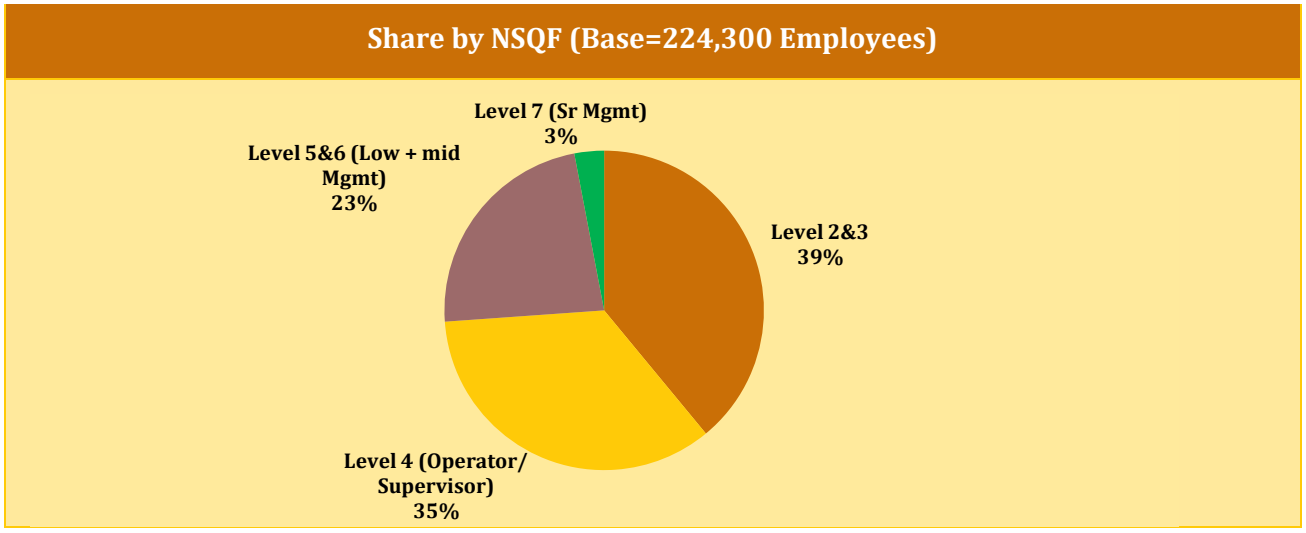


Figure 191: Share of Employees (FY'20): By NSQF levels

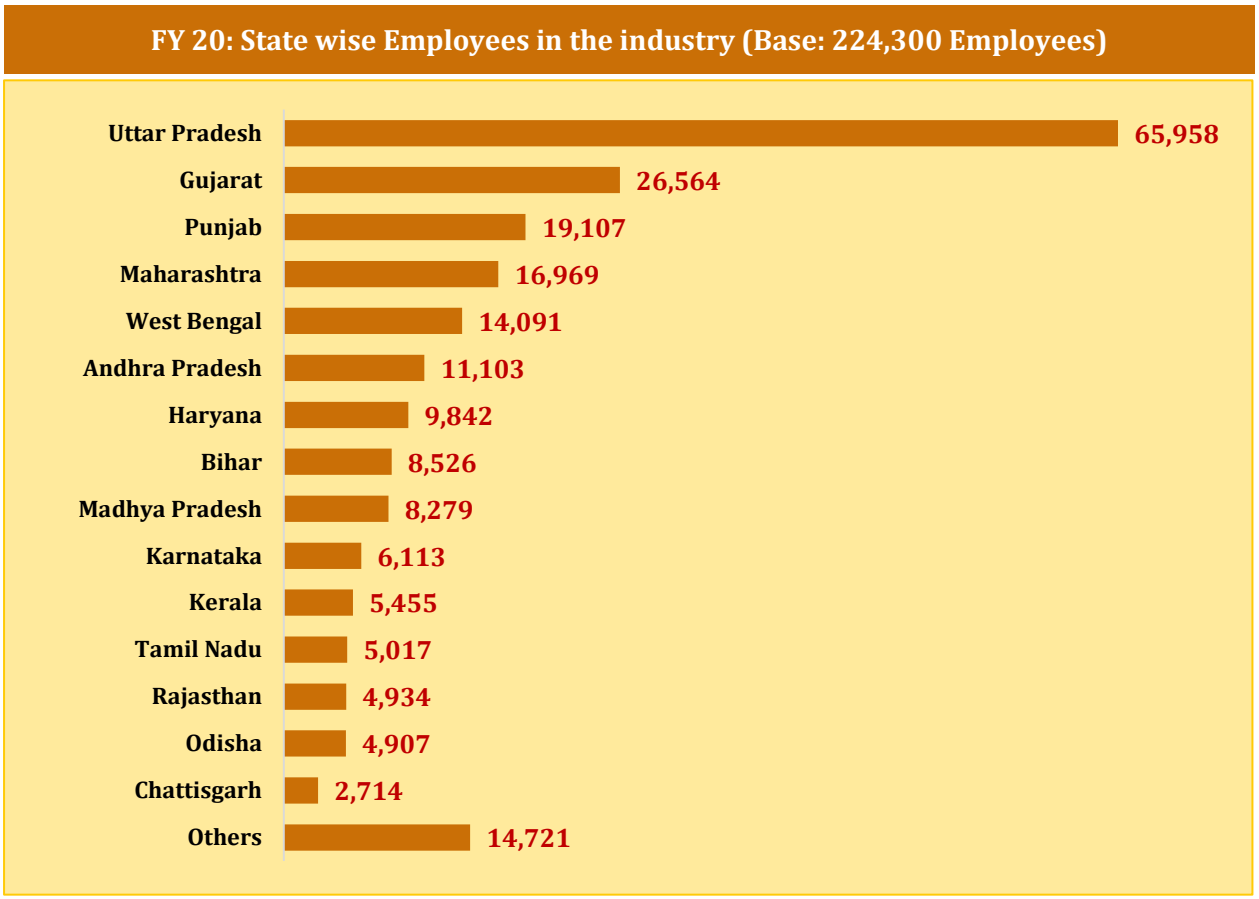


Figure 192: State wise Employees in the Industry (FY'20)

Source: Feedback Analysis

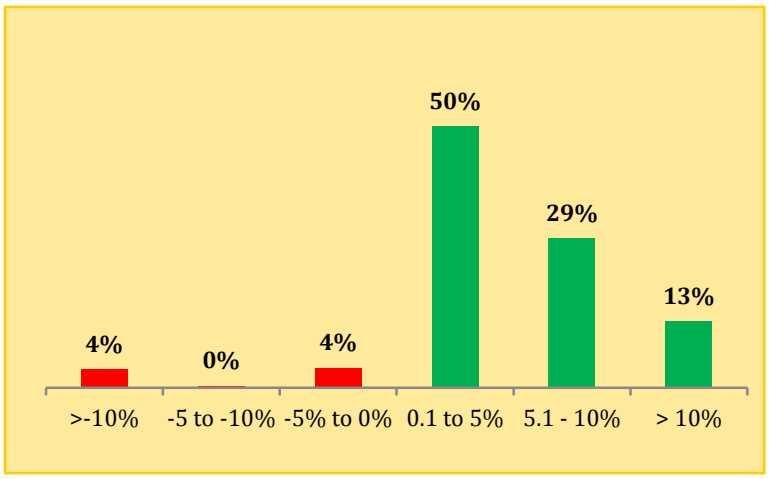
Top 15 states account to 93% of total employment in the industry

Current Key Job Roles & Responsibilities (at Operator-level employees' category)

Sr. No.	Job Roles	Job Profile / Key Responsibilities	NSQF Level	Applicable Type of Enterprises			
				Micro	Small	Medium	Large
1	Supervisor	Monitoring overall operation and managing manpower at operations Transport Scheduler	5	✓	✓	✓	✓
2	Machine Operator	Operating relevant machines at cold storages. Maintaining the right temperature based on product stored.	4	✓	✓	✓	✓
3	Loader / Unloader	Loading & Unloading products in Warehouse / Vehicles	3	✓	✓	✓	
4	Drivers	Vehicle driving	4	✓	✓		
5	Helpers	Misc. work including Loading / Unloading / Cleaning Vehicles, Machinery, etc.	3	✓	✓	✓	✓
6	Technician	Machine maintenance	4	✓	✓	✓	✓
7	Packer	Packing the products based on specifications	3		✓	✓	✓
8	Accountant / Invoicing Clerk	Managing accounting and day to day transaction entry in the ledger	4	✓	✓	✓	
9	Field Executive	Collection of Products from Farmers / Co-ordinating with Farmers. Primarily Speaking to the farmers to bring their products to cold storages	3			✓	✓
10	Production Support	Supporting the pre-packing process (e.g., slicing/cutting F&V; sorting; etc.)	3	✓	✓		

Table 161: Current Key Job Roles & Responsibilities (at Operator-level employees' category)

16.3.3 Past Growth of Employees (FY'17 – FY'20)



- <10% of the enterprises have experienced degrowth in their manpower in the past 3 years.
- 50% have indicated that their manpower has grown marginally (up to 5%).
- >40% experienced the growth on >5% in the past 3 years

Figure 193: Past Growth of Employees (FY'17 – FY'20)

Source: Feedback Analysis

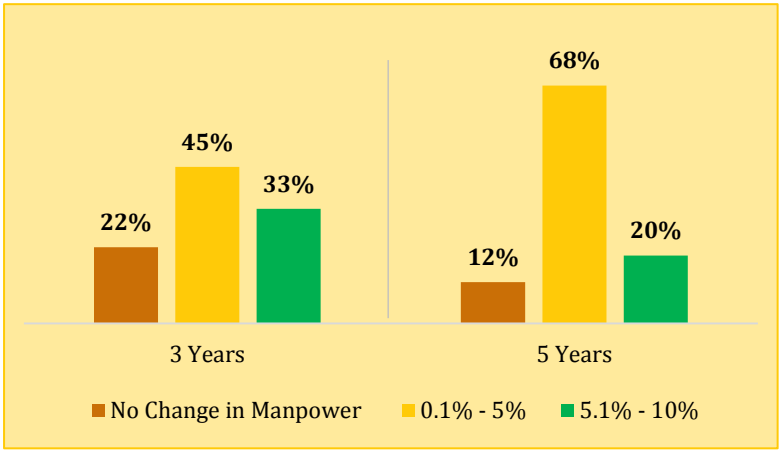
16.3.4 Future Plans of the Companies and its Impact on the Manpower Growth

Future Plans of the Companies covered

Plans	Micro	Medium	Small	Large
Plan to enhance the capacity	52%	51%	62%	87%
Plan to invest on technology	53%	54%	69%	100%
Plans to set up a new facility	1%	0%	6%	53%
New Commodity Addition	0%	3%	6%	0%
Increase / Introduce Exports	0%	4%	0%	0%
Investment in R&D	0%	1%	0%	0%

Table 162: Future Plans of the Companies covered

Manpower Recruitment Plan, Considering the Future Operational Expansion Plans



Considering the future expansion plans of enterprises, it is expected that the manpower is likely to increase by

- 3% – 4% in next 3 & 5 years (Average)

Figure 194: *Manpower Recruitment Plan, Considering the Future Operational Expansion Plans*

Source: Feedback Analysis

16.4 Recruitment & Training Practice

Recruitment Practice

Walk-in is the key source of recruiting candidates across Operational level and Lower level employees. Following are the key institutes encountered during our survey from where the candidates / employees have got trained or graduated before joining the enterprises.

Managerial Level	Key Institutes Encountered (Graduated Institutes of the Current Employees)
Top Management	• Indian Institute of Materials Management • CII – Institute of Logistics • National Institute of Logistics and Material Management • Indian Institute of Logistics
Middle Management	• TCI Institute of Logistics • Academy of Maritime Education & Trading • CII – Institute of Logistics • National Institute of Logistics and Material Management • Institute of Logistics and Aviation Management • Institutes offering programs designed by Logistics Skill Council (Graduates)
Lower Level Management	• Institute of Good Manufacturing Practices India • Institutes offering programs designed by Logistics Skill Council (Diploma / Certifications)
Operator Level Employees	• No specific Institutes. As most of them are either secondary or higher secondary education (Schooling) or less than secondary schooling

Table 163: *Recruitment Practice*

Training Practice

Overall ~30% of the companies we have covered as part of the sample are providing training across levels when an employee joins the firm (On-the-Job training).

% of Companies offering training

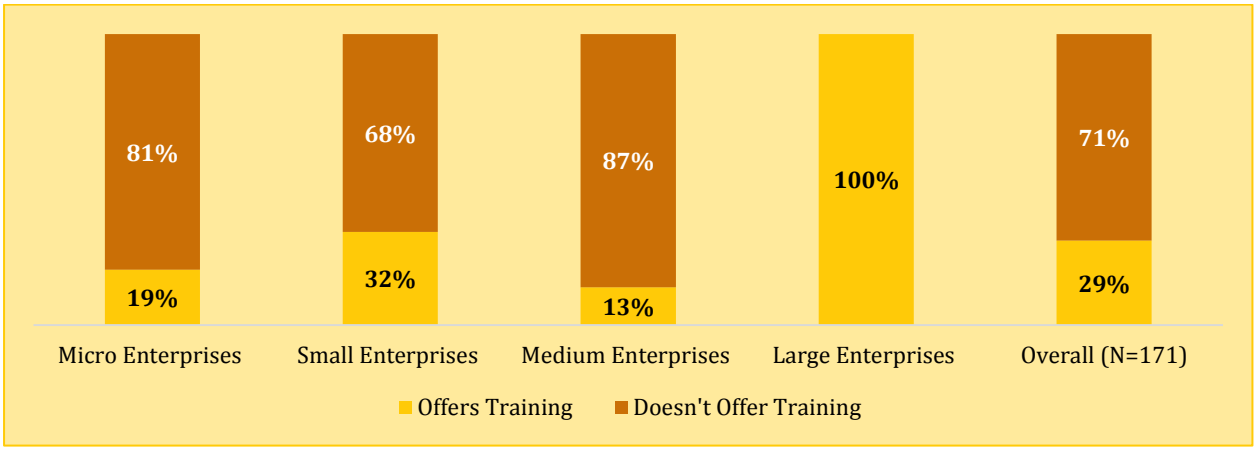


Figure 195: % of Companies offering training

Source: Feedback Analysis

Major Training Topics Covered (Encountered in Primary Interviews)

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Product Handling	Detail the various perishable goods handling requirements. Hygienic handling is the latest module added to the topic	Operator Level Employees & Lower-Level Employees	✓	✓	✓	✓
Temperature Management during Transportation	Reefer Vehicle operations, product handling, temperature requirement for different products	Operator Level (Drivers & Helpers)		✓	✓	✓
Operations Management	Training detailing overall operations, manpower allocation, inspection, etc.	Supervisors / Managers			✓	✓

Training Topics	Remarks	Functional Focus / Job Roles	Micro Enterprises	Small Enterprises	Medium Enterprises	Large Enterprises
Pre-Cooling Operations	Inspection of proper segregation of goods in the pre-cooling chamber. Examining placement and stacking of good for right cooling	Supervisors / Managers				✓
Supervision of perishable product handling activities	Appropriate cooling methods by products, latest technology, equipment operations, etc.	Supervisors / Managers				✓
Plant Maintenance	Maintenance checklist for evaporators, electrical connections etc. Overall SOP for individual machineries	Operator Level Employees & Lower-Level Employees (Technicians / Machine Operators)				✓

Table 164: Major Training Topics Covered

Effectiveness of Training

(Mean score On a Scale of 1 - 7 where 7 is extremely satisfied and 1 is extremely dissatisfied)

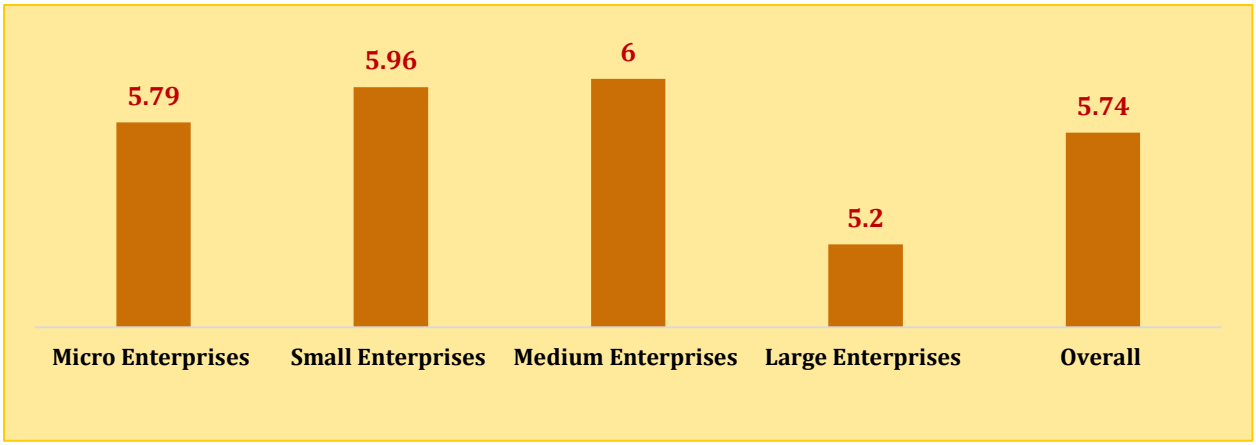


Figure 196: Effectiveness of Training

Source: Feedback Analysis

16.5 Challenges related to Skill Availability Vs Skill Gaps

Skill Acquisition Challenges

Key concerns raised by the cold chain service providers in terms of acquiring the skilled manpower are as follows

No Specialized Programs for Cold Chain

- There are only a few programs that are offered specifically to Cold Chain at present by the logistics skill council
    - Example: Cold Chain Engineering, Reefer Vehicle Operator, Refrigeration Equipment Maintenance, and few others
- There are no specialization courses focused only on Cold Chain. Rather, cold chain related topics are covered as a module in logistics or food science-related programs

Not Aware of Training Institutes Offering Cold Chain Related Programs

- Poor awareness of the training institutes focusing on cold chain
- Cold Chain companies are not aware of training institutes that train operator level employees. Even if there are training institutes for logistics that cover the cold chain, they are clustered in select cities
- Only formal education institutes that are associated with the logistics skill council are known among the large and medium enterprises

Operator Level Employees are not formally trained

- Operator level employees are either secondary/Higher secondary schools and also the school dropouts. 80% of the employees are not trained and on-job training becomes mandatory

- During the on-the-job training, productivity per employee is largely impacted

Skill Gaps by Specific Job Roles

Following are the select key job roles and their required skills and skill gaps

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Cold Storage Manager	Mid Management NSQF: 6	• Managerial Skills • Technical Know-how across functions • Interpersonal Skills • Leadership Skills • Domain Skills (Cold Storage, Temperature Control Equipment, etc.) • Understanding the technology and adaptation to newer technologies	• Ability to work with both the mechanical aspects of multi-commodity storage • Training manpower • Lack of leadership			✓	✓
Transportation Scheduler / Transport Management	Mid Management NSQF: 4	• Direct oversight to all freight/traffic-related activities • Negotiate with freight forwarders and brokers for all Cold Chain locations • Manage the flow of inbound and outbound shipments	• Knowledge of all shipping terms and documentation for both international and domestic shipping (Incoterms and other relevant documents)		✓	✓	✓
Inventory Controller	Mid Management NSQF: 4	• To develop inventory management systems, maintain stock levels, and coordinate the logistics of orders and transfers.	• Knowledge of inventory management software • Analysis of demand and supply of multi-commodities	✓	✓	✓	✓

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
Shift Supervisor / Supervisor	Lower-Level Management NSQF: 5	• Overseeing cold chain operations including refrigerated storage, transportation, and data entry operations • Technical and non-technical Know-how knowledge • Equipment operations and maintenance • Manpower planning • Manpower training	• Gaps in leadership/supervision skills leading to efficiency and monitoring issues • Lack of technical knowledge on multi-commodity storage practice • Best practices w.r.t material handling to reduce wastage during material handling • Gaps in core technical skills (e.g., operator should know about the maintenance as well)	✓	✓	✓	✓
Maintenance Officer	Lower-Level Management NSQF: 4	• Knowledge on transformation from analogue to digital business model • Domain Skills	• Lack of update in technology	✓	✓	✓	✓
Drivers	Operator Level Employees NSQF: 4	• Driving Skills (by various vehicle categories) • Vehicle Maintenance • Temperature Maintenance by multi-commodities • Understanding documentation and other relevant process related to interstate travel and logistics	• Lack of technical knowledge to rectify the mechanical problems of the reefer vehicles • Lack of product understanding & the handling requirements (e.g., temperature)	✓	✓	✓	✓
Clerks (Invoicing and other activities)	Operator Level Employees NSQF: 4	• Prepare invoice • Compile and maintain records of all billings	• Technical competencies	✓	✓		

Job Roles	Managerial Level & NSQF Level	Skills Required	Skill Gaps	Skill Gaps by Type of Enterprises			
				Micro	Small	Medium	Large
		• Assist accounting team in preparing relevant documents					
Loading / Unloading Labors	Operator Level Employees NSQF: 3	• Materials Handling	• Inability to learn and operate across functions	✓	✓	✓	✓
Helpers	Operator Level Employees NSQF: 3	• Understanding the job roles in various interlinked functions • Materials Handling	• Sanitation and Hygienic awareness and knowledge/practice • Inability to learn and operate across functions	✓	✓		

Table 165: Key job roles and their required skills and skill gaps

16.6 Future Projection – Sector & Employment

Requirement of Cold Storage in the country between FY'20 and FY'30 (Excluding Potato Cold Storage)

Cold Storage is an enabling sector and requirement of Cold Storage will depend on growth of some of the key Processing sectors such as Dairy, Fruits & Vegetables, Meat & Poultry, RTE/RTC and Fish & Sea Foods

Sub-sector	Dairy	F&V	Poultry & Meat	RTE/RTC	Fish & Sea Foods	TOTAL
FY'20 Processing Volume ('000 MT)	40,835	8,542	1,752	135	26	**51,290**
% Coming under Cold Chain*	75%	15%	60%	60%	75%	
FY'20 Cold Storage requirement ('000 MT)	30,626	1,281	1,051	81	20	**33,059**
FY'30 Processing Volume ('000 MT)	1,18,292	17,500	3,925	459	101	**1,40,277**
% Coming under Cold Chain*	80%	40%	80%	80%	80%	
FY'30 Cold Storage requirement ('000 MT)	94,634	7,000	3,140	367	80	**1,05,222**
Additional Cold Storage space required ('000 MT)	64,008	5,719	2,089	286	61	**72,162**
Inventory Turnover Days	5	15	21	10	21	

Sub-sector	Dairy	F&V	Poultry & Meat	RTE/RTC	Fish & Sea Foods	TOTAL
No. of 500 MT equivalent Cold Storage required	1,754	470	240	16	7	2,487

Table 166: Requirement of Cold Storage in the country between FY'20 and FY'30 (Excluding Potato Cold Storage)

** Based on discussions with the processing units in the respective sectors, SMEs and Visionaries*

Requirement of Reefer Trucks in the country between FY'20 and FY'30

Reefer Trucks	Value	Comments
No. of Reefer Trucks in FY'20	18,000	Around 200 players are operating with 18,000 reefer vehicles in India. Of these, 25 – 30 players are national/Pan India players while the rest of the players are unorganized / regional players
Approx. No. of Reefer Trucks addition every year for next 10 years	1,500	
Estimated cumulative addition of Reefer Trucks between FY'20 & FY'30	15,000	

Table 167: Requirement of Reefer Trucks in the country between FY'20 and FY'30

Requirement of Pack Houses in the country between FY'20 and FY'30

Pack Trucks	Value	Comments
No. of Pack Houses in FY'20	400	
Approx. No. of Pack Houses addition every year for next 10 years*	50	
Estimated cumulative addition of Pack Houses between FY'20 & FY'30	500	Around 70% of these pack houses are likely to established in West & South. While India need minimum of around 20,000 - 25,000 Pack Houses, it is not being currently established to match the demand.

Table 168: Requirement of Pack Houses in the country between FY'20 and FY'30

**Discussion with SMEs & Visionaries*

Investment required for creating additional Cold Chain infrastructure in the country

Parameter	Cold Storage (500 MT equiv.)	Reefer Trucks	Pack Houses
Additional infrastructure required between FY'20 & FY'30 (Nos.)	2,487	15,000	500
Approx. Investment / Unit (Rs. Lacs)	40	25	15

Parameter	Cold Storage (500 MT equiv.)	Reefer Trucks	Pack Houses
Total Investment required (Rs. Cr.)	995	3,750	75
Grand Total (Rs. Cr.)	4,820		

Table 169: Investment required for creating additional Cold Chain infrastructure in the country

Source: Feedback Body of Knowledge, SMEs etc.

Select ongoing and upcoming projects in Cold Chain sector in India

SL #	Company Name	Project Name	Project Location	Project Type	Cost (Rs. Cr.)
1	Department of Industries, Himachal Pradesh	Cold Storage (Haroli) Project	Una, Himachal Pradesh	New Unit	500
2	National Collateral Mgmt. Services Ltd.	Amravati Cold Chain & Storage Infrastructure Project	Amravati, Maharashtra	New Unit	100
3	Asandas & Sons	Mehsana Cold Chain Unit (Fruits and Vegetables) Project	Mahesana, Gujarat	New Unit	93
4	Snowman Logistics Ltd.	Cold Storage Expansion Project	NCT of Delhi	Expansion	90
5	Three Seasons Exim Ltd.	East Godavari Cold Chain (Marine & Fishery) project	East Godavari, Andhra Pradesh	New Unit	86
6	KLG Imports & Exports Pvt. Ltd.	Cold Storage (Kingal) Project	Kinjal, Himachal Pradesh	New Unit	70
7	Spipick Foods	Kanpur Cold Chain Project	Kanpur, Uttar Pradesh	New Unit	67
8	Avana Logistek Ltd.	Khed (Pune) Cold Storage Facility Project	Pune, Maharashtra	New Unit	65
9	C R P L Infra Pvt. Ltd.	Deras (Sea Food Park) Cold Chain Project	Khorda, Odisha	New Unit	62
10	Cella Space Ltd.	Edayar Dry Chill Cold Storage Logistic Park Project	Ernakulam, Kerala	New Unit	60

Table 170: Select ongoing and upcoming projects in Cold Chain sector in India

Source: CMIE & Projects Today

FY'20 employment estimation in Cold Chain industry (Including Potato Storage) in India

Parameter	Cold Storages	Reefer Trucks	Pack Houses	Total
Universe	7,000	300	300	**7,600**
Installed Base (Nos.)	8,186	18,000	400	**26,586**
FY'20 Total No. of Employees	**1,85,000**	**35,250**	**4,050**	**2,24,300**
FY'20 Av. No. of Employees / Unit	**23**	**2**	**10**	

Table 171: FY'20 employment estimation in Indian Cold Chain industry (Including Potato Storage)

**Discussion with respective Cold Chain segments and SMEs*

Future employment projection in Indian Cold Chain industry (Excluding Potato Storage)

Parameter	500 MT equiv. Cold Storages	Reefer Trucks	Pack Houses	Total
Projected Additions (Nos.)	2,487	15,000	500	**17,987**
Av. No. of Employees / Unit*	15	2	10	
FY'20 - FY'30 Employment Generation potential	**37,300**	**29,375**	**5,063**	**71,738**

Table 172: Future employment projection in Cold Chain industry (Excluding Potato Storage) in India

** As per discussion with the Cold Chain operators and SMEs, share of large and medium enterprises are likely to increase marginally over next 10 years' time. The same has been considered in future employment potential calculation*

 # Based on discussions with equipment manufacturers and SMEs, there could be marginal adoption of automation / industry 4.0 in the coming years. However, that will have negligible impact on the productivity of the employees. Hence, the same productivity values have been considered for future employment generation potential.

Share of FY'20 - FY'30 Employment Generation potential Break by Different Category (Organized Segment)

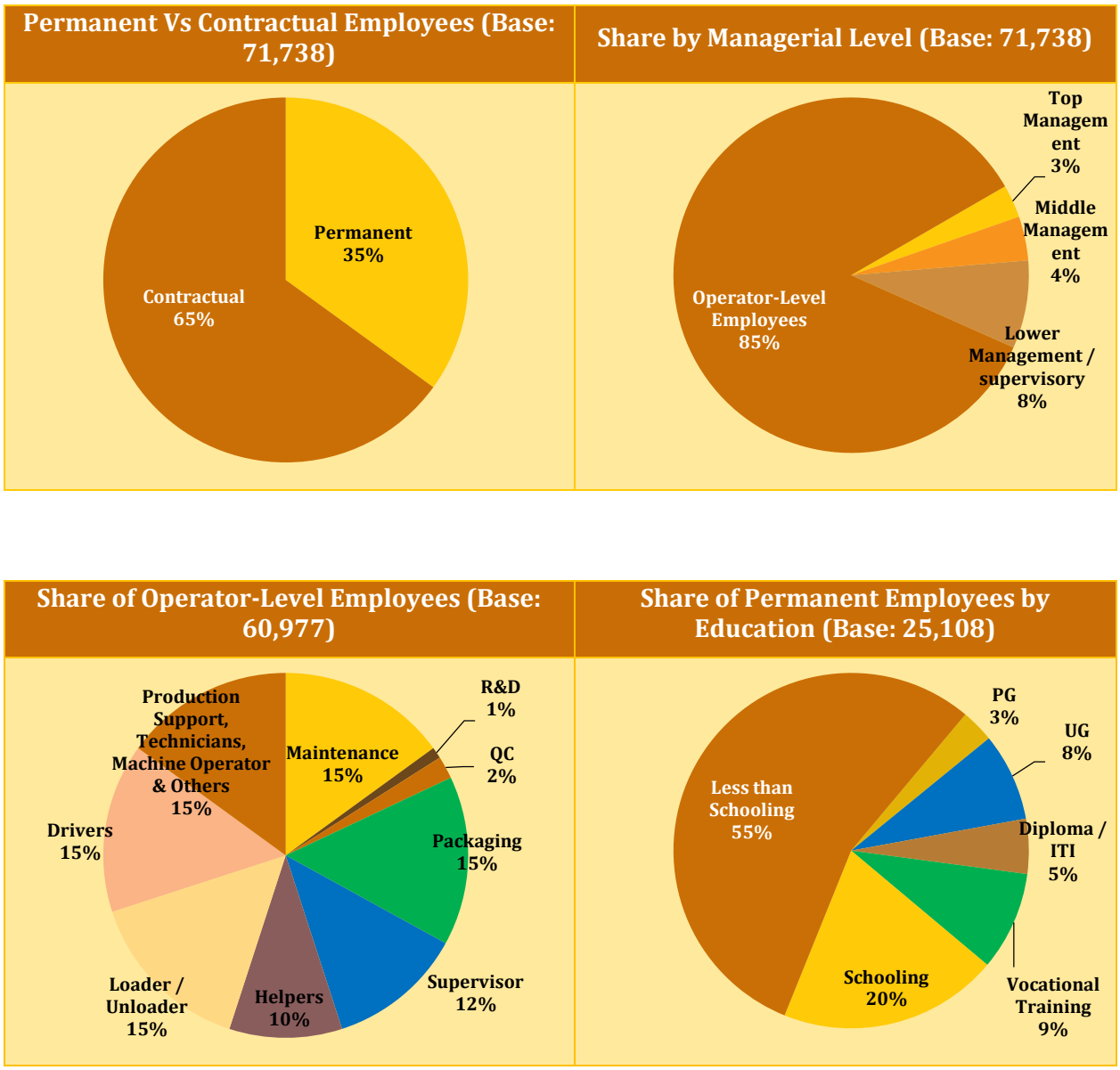


Figure 197: Share of FY'20 - FY'30 Employment Generation potential: By Different Category

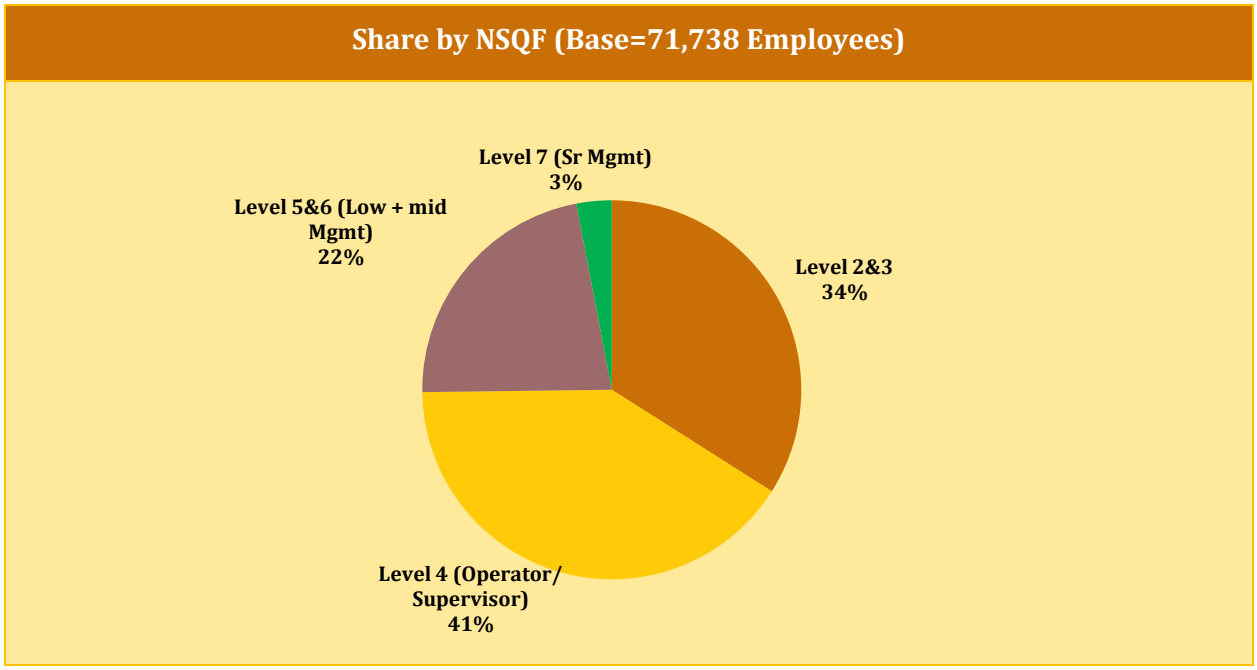


Figure 198: Share of FY'20 - FY'30 Employment Generation potential : By NSQF levels

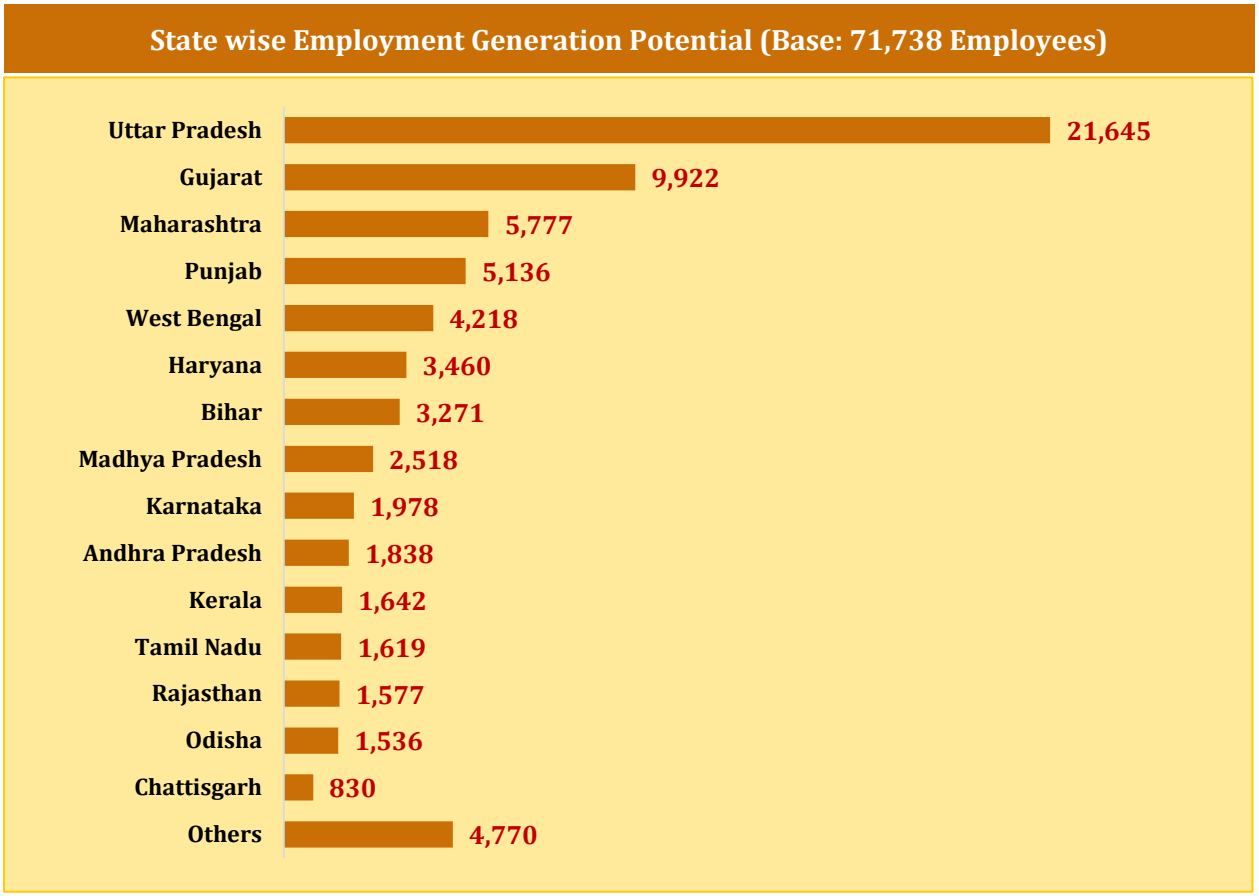


Figure 199: State wise Employment Generation Potential

Source: Feedback Analysis

Top 15 states account to 93% of total employment in the industry

16.7 Existing & Emerging Prominent Job Roles Which Requires Skilling

Following are the specific existing and emerging prominent job roles that will create employment opportunities in Cold Chain Sub-sector in future

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.	✓	✓		
Cold Storage Worker	3	A Cold Storage Worker is responsible for carrying out various activities at a cold storage under supervision such as loading and unloading; pre-cooling and cooling the produce. The individual also carries out sorting, grading, and slicing.	**A Cold Storage Worker must be able to:** • Load and unload produce without causing damage to it. • Maintain dry floor and cleanliness in the cold storage. • Pre-cool and cool the produce as per instructions. • Follow the applicable food hygiene and safety standards.	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			A Cold Storage Worker must know and understand: • Safe loading and unloading practices. • How to maintain safety and hygiene at the cold storage. • Applicable food hygiene and safety standards. • Applicable parameters for sorting and grading the relevant types of produce.				
Cold Storage & Refrigeration Plant Mechanic	4	A Cold Storage & Refrigeration Plant Mechanic is responsible for carrying out repair and maintenance of various refrigeration plant equipment such as compressors, refrigeration piping and controls, condensing and evaporator system, cooling towers, water systems, etc.	**A Cold Storage & Refrigeration Plant Mechanic must be able to:** • Maintain the chillier, air compressor unit, air dryer and cooling tower. • Handle the operational responsibility of the chillier and air compressor unit, chest freezers/ Coolers, AC, and other refrigeration equipment. **A Cold Storage & Refrigeration Plant Mechanic must know and understand:** • Functioning and maintenance of different types of refrigeration systems such as Freon, Ammonia, and hybrid systems such as Ammonia + Glycol system. • How to interpret control and power wiring drawings to be able to check and rectify the issues with various refrigeration equipment.		✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Material Handling Equipment Operator	4	A Material Handling Equipment Operator uses a variety of equipment such as forklift, reach trucks and pallet trucks for handling a variety of material.	**A Material Handling Equipment Operator must be able to:** • Operate forklift, reach trucks, pallet truck, etc. • Unload inbound shipments safely and move product to storage locations. • Stack and store the merchandise efficiently. • Prepare product for shipping, ensuring that the exact number and type of product is loaded and shipped. • Check that inbound and outbound shipments are accurate and free of damage. • Carry out standard maintenance of the material handling equipment. **A Material Handling Equipment Operator must know and understand:** • Procedure for safe handling of a variety of materials. • Basic inventory management and book-keeping practices.		✓	✓	✓
Reefer Truck Driver	4	A Reefer Truck Driver is responsible for transporting a variety of perishable food items under controlled temperature. The individual is required to	**A Reefer Truck Driver must be able to:** • Operate reefer truck safely. • Handle variety of food items appropriately. • Monitor and regulate temperature according to			✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
		regulate the temperature according to the food item being transported to maintain its quality.	the food item being transported. • Maintain the reefer truck and its cleanliness. • Ensure correct functioning of the cooling unit. **A Reefer Truck Driver must know and understand:** • How to operate and maintain a reefer truck. • Appropriate temperature to maintain during transit for a variety of perishable food items. • Applicable health and safety standards.				
Cold Storage Supervisor	5	A Cold Storage Supervisor is responsible for supervising and coordinating the activities of cold storage plant workers. The individual is also responsible for monitoring and ensuring effective utilization of storage space based on type of commodities or products stored at the cold storages.	**A Cold Storage Supervisor must be able to:** • Supervise and direct a team of Cold storage unit workers including training, planning daily operations, and allocating work. • Inspect the cold storage systems, temperature control and products stored to ensure correct functioning and adherence to the applicable standards. • Coordinate with relevant agencies or vendors for the repair and maintenance activities when required. **A Cold Storage Supervisor must know and understand:** • Functioning of different types of refrigeration systems such as Ammonia	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
			or Hydrocarbon based refrigeration systems. • Temperature required for individual commodity being stored at the facility. • Effective team management practices. Applicable health and safety standards.				
Food Laboratory Assistant	5	Conduct standardized tests on food, beverages, additives, or preservatives to ensure compliance with standards and regulations regarding factors such as color, texture, or nutrients. Test quality of materials or finished products.	**A Food Laboratory Assistant must be able to:** • Test the raw materials and finished products to ensure compliance with standards and regulations and adherence to the organization's food safety and hygiene policy. • Analyze test results to classify products or compare results with standard tables. • Perform regular maintenance of laboratory equipment by inspecting calibrating, cleaning, or sterilizing. • Examine chemical or biological samples to identify cell structures or to locate bacteria or extraneous material, using a microscope. **A Food Laboratory Assistant must know and understand:** • Applicable food safety and hygiene standards. • Record research or operational data			✓	✓
Food Safety &	6	A Food Safety & Hygiene Manager is responsible for	**A Food Safety & Hygiene Manager must be able to:**	✓	✓	✓	✓

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required	Major Category of Enterprises for Emerging Job Role			
				Micro	Small	Medium	Large
Hygiene Manager		implementing the food safety policies and standards in the food processing plant. The individual is also responsible for training other employees; maintaining documentation; ensuring that products meet the applicable quality standards; educating suppliers; and conducting safety audits.	• Ensure adherence to the organization's food safety and hygiene policy. • Train the processing plant employees on the use of relevant systems. • Ensure maintenance of the record of operations and review them periodically. • Manage supplier relationships. Conduct safety audits. **A Food Safety & Hygiene Manager must know and understand:** • Applicable food safety and hygiene standards. • Record maintenance and review procedures. • Supplier management. • Safety audit procedures.				

Table 173: Existing and emerging prominent job roles that will create employment opportunities

Skill Sets required across multiple levels in the sector

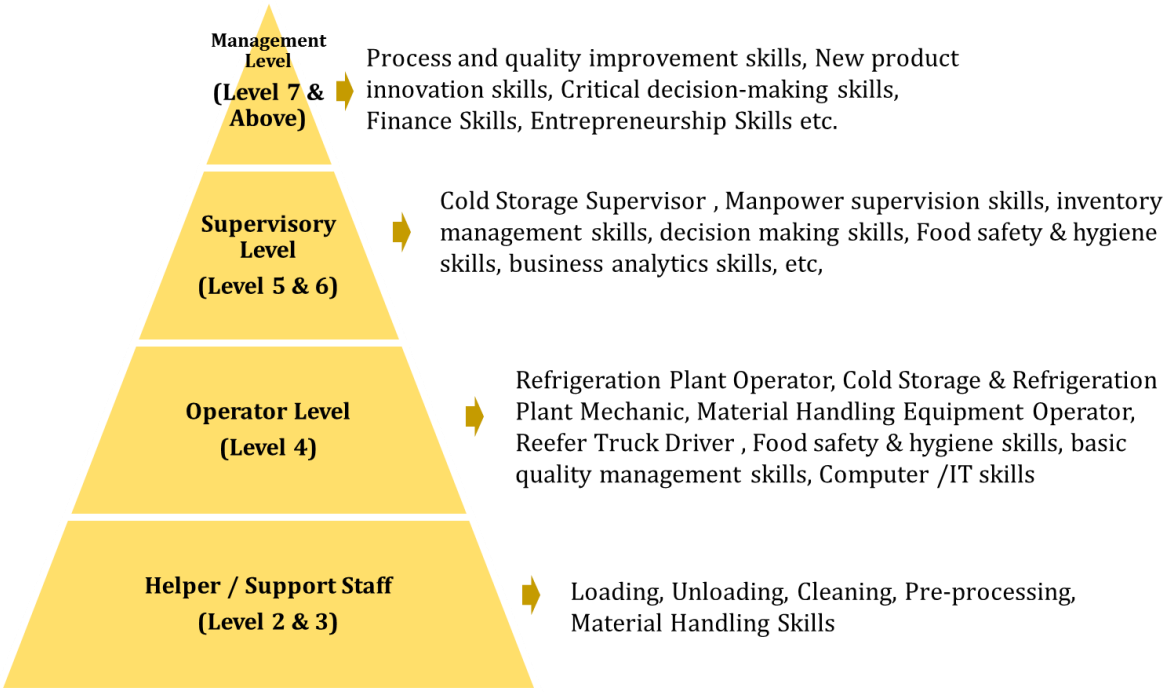


Figure 200: *Skill Sets required across multiple levels in the sector*

16.8 Expectations from the Industry Stakeholders

Institutes offer a wide variety of courses, which includes undergraduate, postgraduate, diploma and certificate courses in areas, such as supply chain management, warehousing and transportation that includes a module on Cold Chain.

Need for Specialized Training Institutes Focusing Cold Chain

- Specialized training institutes that cater to the needs of the Cold Chain industry should be developed and focused on skilling of manpower.
- Current infrastructure covers overall Logistics and Warehouse skill development and not specialized programs for Cold Chain requirements in detail.

Collaboration with Equipment Manufactures and Cold Chain Industries

- Technical courses like refrigeration plant operator, mechanics and new development technologies should be addressed with the combined efforts with the equipment manufacturers and the Cold Chain industry
- Curriculum should be co-created with the recommendation from the cold chain service providers, equipment suppliers and other stakeholders

Creation of Training Infrastructure Focusing Tier-II cities along with Tier I cities

- Industry is expecting the creation of regional training infrastructure covering Tier I and Tier-II cities.
- Cold chain infrastructure is being created in tier II cities and the training institutes growth to be correlated with it

Offering Sandwich Courses

- Offering certification or diploma programs at the lower level where the course involving practical work experience in addition to academic study
    - Example: If an institute offers 1 year program, it can be 6-month classroom training and 6 months practical training or internship with the large and medium cold chain service providers.

Chapter 17: Skill Needs for the Unregistered units that can be considered for the PMFME scheme

The focus of the study was not specific to the unregistered segment, however based on the inputs from the industry and the experts from each segment, we have listed the key job roles for all the sectors of interest for the unregistered units in each sector in the below sections.

This section covers the details on the job roles that can be potentially considered for the unregistered units when they formalise, and which can be offered as part of the PMFME scheme. These job roles have been selected based on our interviews with the industry veterans and the SMEs.

17.1 BREAD & BAKERY PRODUCTS

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Oven Operator or Baking Equipment Operator	4	An Oven Operator is responsible for operating bakery industrial ovens at commercial establishments. The individual is also responsible for carrying out minor repair and maintenance of the oven.	**An Over Operator must be able to:** • Load and unload the oven with the bakery products. • Monitor gauges, dials, or other indicators to ensure oven works as expected. • Regulate the oven temperature according to the product being baked.

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
			• Alter the position of baking trays in the oven during the baking process for the optimum heat distribution. **An Over Operator must know and understand:** • How to operate a variety of industrial bakery ovens. • Appropriate temperature required for baking a variety of bakery products. • How to perform general troubleshooting of a variety of industrial bakery ovens.
Bread Slice Machine Operator	4	A Bread Slicer Operator is responsible for slicing the baked bread. The individual is also responsible for shifting the sliced breads for further packaging.	**A Bread Slicer Operator must be able to:** • Operate the slice machine with ease and to slice the with uniform size. • Clean the slicer machine frequently to avoid any damage due to crumbs. • Handle the sliced bread from the slicer machine to packaging point without any wastage. **An Over Operator must know and understand:** • How to operate a variety of slicer machines (Varies by type of breads / cake loafs). • How to perform general troubleshooting of a slicer machine.
Ingredients Process Mixers Operators	4	An Ingredients Process Mixer Operator is responsible for mixing the dough and other ingredients and prepare for baking the bread and bakery products.	**An Ingredients Process Mixer Operator must be able to:** • Operate the mixer (Machine) with ease and to mix all the ingredients to make a final dough for further baking or processing. • Measure the list of ingredients as per the product requirement. • Clean the mixer after every batch to avoid any contamination. **An Over Operator must know and understand:** • The measurement and list of ingredients required for the product baking

Table 174: Bread & Bakery Products: Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Machine Operator - Oven Operator or Baking Equipment Operator / Bread Slice Machine Operator / Ingredients Process Mixers Operators

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company
- Skills for Machine operators – The operators should know to Operate, Handle, Clean and perform general troubleshooting of the machine

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning and Food Safety & Hygiene.

Craft Bakery Training is a new skill that is seen to have an upcoming demand for this sector and with individuals.

17.2 DAIRY PRODUCTS

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Machine & Truck Cleaners	3	A Machine & Truck Cleaners is responsible for carrying out cleaning activities under supervision such as cleaning of	**A Machine & Truck Cleaners must be able to:** • Effectively use the cleaning agents for cleaning the machinery and trucks after every batch and trips respectively.

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
		machineries after every batch of production and cleaning the trucks before loading milk after every trip to avoid contamination	• Effective cleaning of Machinery and Trucks and remove any particles from previous batch to avoid contamination of products. **A Machine & Truck Cleaners must know and understand:** • How to clean the machinery & trucks • How to handle the chemicals and other cleaning agents.
Paneer Press Machine Operator	4	A Paneer Press Machine Operator is responsible for Pressing the milk solids to make Paneer in required density. The individual also carries out standard maintenance of the Paneer press machines.	**A Paneer Press Machine Operator must be able to:** • Operate the paneer press machines for processing panner or cottage cheese. • Store the processed paneer products appropriately. **A Paneer Press Machine Operator must know and understand:** • Pressing technique for minimal wastage. • Equipment Maintenance for any emergency. • Applicable health and safety standards
Container Filling Machine Operator (includes mawa / sweet / curd makers)	4	A Container Filling Machine Operator is responsible for dairy products by using the "Container Filling Machine".	**A Container Filling Machine Operator must be able to:** • Use the appropriate packaging material according to the type of dairy products. • Operate the Container Filling Machines with ease. • Follow the applicable food hygiene and safety standards. • Carry out standard repair and maintenance of the machine. **A Container Filling Machine Operator must know and understand:** • How to prepare and use the machine. • Applicable food and personal safety standards. • How to maintain the machine.

Table 175: Dairy Products: Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Machine Operator – Operate the paneer press machines for processing paneer or cottage cheese and other equipment based on the products manufactured

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company
- Skills for processing and packaging Machine operators – The operators should know to Operate, Handle, Clean and perform general troubleshooting of the machine. Also, for packaging have a basic understanding of the appropriate type of packaging material to be used according to the type of dairy products

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning, Food Safety & Hygiene, standard recipes and procedures of making traditional sweets and other dairy products and New Technologies in Dairy Sector.

17.3 FISH & SEAFOOD PROCESSING

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Shell remover and Cleaner	3	A Shell remover and Cleaner is responsible carrying out various pre-processing activities under supervision such as cleaning and gutting fish; cutting fish into fillets or steaks; etc.	**A Shell remover and Cleaner must be able to:** • Clean, gut and cut fish into fillets or steaks. • Remove shells from select seafoods. • Carry and sorting and grading of fish and seafood. • Store fish and seafood at the recommended temperature. • Follow the applicable food safety and hygiene standards. **A Shell remover and Cleaner must know and understand:**

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
			• Relevant parameters for sorting and grading fish and seafood. • Applicable food and personal safety standards.
Defrosting & Washing Machine Operators	4	A Defrosting & Washing Machine Operators is responsible for setting up and operating machinery defrost and wash the fish and seafood.	**A Defrosting & Washing Machine Operators must be able to:** • Set up and operate defrosting and washing machinery to defrost the frozen fish and wash the same for further processing. • Ensure compliance with the applicable quality standards by carrying out corrective machine adjustments as required. • Follow the applicable food hygiene and safety standards. **A Defrosting & Washing Machine Operators must know and understand:** • Applicable food and personal safety standards.
Filleting & Cutting Machine Operator	4	A Filleting & Cutting Machine Operator is responsible for setting up and operate the processing machinery for filleting and cutting the fish and seafood to make a required end product.	**A Filleting and Cutting Machine Operators must be able to:** • Set up and operate filleting and cutting machinery to processing fish and seafood to make a required end product or to prepare for further processing. • Ensure compliance with the applicable quality standards by carrying out corrective machine adjustments as required. • Follow the applicable food hygiene and safety standards. **A Filleting and Cutting Machine Operators must know and understand:** • Applicable food and personal safety standards.

Table 176: Fish & Seafood Processing: Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Cleaning & Sorting: Clean, gut and cut fish, remove shells from select seafoods.
- Machine Operator – Operate the Defrosting & Washing Machine, Filleting & Cutting machines

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company
- Basic Cleaning and Sorting: Basic skills to Clean, gut and cut fish into fillets or steaks. Need to also sort and grade the fish
- Skills for Machine operators – The operators should know to operate, defrosting and washing machinery to defrost the frozen fish. Set up and operate filleting and cutting machinery to processing fish and seafood to make a required product or to prepare for further processing.

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning, Food Safety & Hygiene and Exports Marketing direction.

17.4 FRUITS & VEGETABLE PROCESSING

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Grader, Sorter & Cleaner	3	A Grader, Sorter & Cleaner is a Pre-Processing Operator perform various activities such as blanching, pre-treatment and applicable of chemical preservatives as part of the pre-processing process to prepare the F&V for further processing.	**A Grader, Sorter & Cleaner operator must be able to:** • Clean fruits and vegetables. • Carry out blanching to inactivate enzymes and microorganisms. • Cure root and tubers following the appropriate practices. • Carry out pre-treatment of produce at cold or high temperature. • Apply chemical preservatives to control pests.

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
			• Store pre-processed fruits and vegetables appropriately. **A Grader, Sorter & Cleaner must know and understand:** • Various methods of pre-processing fruits and vegetables and relevant requirements. • Applicable food hygiene and safety standards. • Use of the relevant tools and equipment. • Use of a ripening chamber.
Bottling / Pouch Plant Operator	4	A Bottling / Pouch Plant Operator is responsible for packing fruits and vegetables using the appropriate packaging equipment.	**A Bottling / Pouch Plant Operator must be able to:** • Select and use the appropriate packaging material according to the type of processed fruits and vegetables. • Prepare and operate the appropriate packaging equipment to pack a variety of fruits and vegetables. • Follow the applicable food hygiene and safety standards. • Carry out standard repair and maintenance of the packaging equipment. **A Bottling / Pouch Plant Operator must know and understand:** • Appropriate packing material to be used to pack. • How to prepare and use the relevant packaging equipment. • Applicable food and personal safety standards. • How to maintain the packaging equipment.

Table 177: Fruits & Vegetable Processing: Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Cleaning & Sorting - Clean fruits and vegetables.
- Machine Operator – Operate the Bottling / Pouch filling and other machines

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company,
- Cleaning & Sorting – Basic skill to clean fruits and vegetables, carry out pre-treatment of produce at cold or high temperature, apply chemical preservatives to control pests & Store pre-processed fruits and vegetables appropriately
- Machine Operator – Skill to carry out fruits and vegetable processing activities using machines, Appropriate use of packing machine and material to be used to pack.

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning, Food Safety & Hygiene, Packaging Trends and Retail marketing.

17.5 MEAT & POULTRY PROCESSING

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Meat & Poultry Pre-Processor	3	A Meat & Poultry Pre-processor is responsible for carrying out relevant meat and poultry pre-processing activities under supervision such as cleaning, curing, storing, etc.	**A Meat & Poultry Pre-processor must be able to:** • Clean the meat and poultry products appropriately. • Cure the meat and poultry products following the recommended methods under supervision. • Store the pre-processed meat and poultry products appropriately. • Follow the applicable food hygiene and safety standards.

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
			A Meat & Poultry Pre-processor must know and understand: • Applicable food and personal safety standards. • Process of cleaning and curing meat and poultry products. • Appropriate conditions for storing meat and poultry products.
Deboning & Slaughter Butcher	3	A Deboning & Slaughter Butcher is responsible for slaughtering beef, sheep, goat, fish, pork and poultry by boning or deboning meat under supervision to meet the given targets and ensure compliance with the applicable standards.	**A Deboning & Slaughter Butcher must be able to:** • Bone or debone meat as per the given instructions. • Use the relevant tools and equipment ensuring personal safety. • Follow the applicable food hygiene and safety standards. **A Deboning & Slaughter Butcher must know and understand:** • How to bone or debone different types of meat using the relevant tools and equipment. • Applicable food hygiene and safety standards.

Table 178: Meat & Poultry Processing: Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Preprocessor and Butcher: Clean the meat and poultry products appropriately. Deboning & Slaughter Butcher is responsible for slaughtering beef, sheep, goat, fish, pork and poultry by boning or deboning meat

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company,
- Pre processor and Butcher: Basic Skills to load the animals in slaughter line and responsible for initial processing and scalding, dehairing, washing, etc. appropriately.
    - Poultry: Clean the meat and poultry products appropriately, cure the meat and poultry products
    - Meat: Bone or debone meat using the relevant tools and equipment ensuring

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning, Food Safety & Hygiene, Ecommerce and Retail Marketing.

17.6 MILLING

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Milling Machine Operator	4	A Milling Machine Operator is responsible for preparing and operating milling machine to mill different types of grains such as rice, wheat, pulses, etc. The individual also carries out general maintenance of the milling machine.	**A Milling Machine Operator must be able to:** • Prepare the milling machine for operation Operate milling machine to mill different types of grains • Carry out general maintenance of the milling machine **A Milling Machine Operator must know and understand:** • How to operate and maintain a milling machine • Applicable food hygiene and safety standards

Table 179: Milling : Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they

might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Machine Operator & Packers: Machine operations and maintenance

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company,
- Machine Operator - Basic skills to Prepare the milling machine for operation, Operate milling machine to mill different types of grains and to carry out general maintenance of the milling machine
- Packers: Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning and Food Safety & Hygiene.

17.7 BEVERAGES (TEA AND COFFEE)

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Coffee Huller Operator	4	A Coffee Huller Operator is responsible for de husking and polishing of coffee bean. The individual is also	**A Coffee Huller Operator must be able to:** • De Husk or complete separation of the husk from the coffee beans for further processing.

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
		responsible for maintaining the huller.	• Prepare the work area and machineries for processing coffee • Perform general maintenance of the machineries **A Coffee Huller Operator must know and understand:** • Use of different types of machineries used in coffee processing plants • How to perform general maintenance of the processing machineries
Dryer / Roaster Plant Operator	4	A Dryer / Roaster Plant Operator is responsible for processing Tea & Coffee using various methods like evaporation and drying technology.	**A Dryer / Roaster Plant Operator must be able to:** • Roasting of Chicory Cubes, Spray Drying, Continuous extraction of Tea and process using evaporation and drying technology. • Perform general maintenance of the machineries **A Dryer / Roaster Plant Operator must know and understand:** • Use of different types of machineries used in Tea & coffee processing plants • How to perform general maintenance of the processing machineries

Table 180: Beverages (Tea and Coffee): Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Machine Operator: Machine operations and maintenance in tea and coffee plants

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company,
- Machine Operator - Basic skills to operate use of different types of machineries used in Tea & coffee processing plants
    - Tea: Roasting of Chicory Cubes, Spray Drying, Continuous extraction of Tea and process using evaporation and drying technology

- Coffee: To de husk or complete separation of the husk from the coffee beans for further processing.

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning and Food Safety & Hygiene.

17.8 RTE & RTC PRODUCTS

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/ unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Pre-Processing Labours	3	An Ingredient Preparator is responsible for selecting and preparing the ingredients for the processing of Ready to Eat (RTE) and Ready to Cook (RTC) products.	**An Ingredient Preparator must be able to:** • Select the appropriate raw materials required for production of RTE and RTC products • Carry out cleaning, grading, peeling, as per the supervisor's instructions **An Ingredient Preparator must know and understand:** • Different industrially important RTE and RTC products • Various ingredients used for making RTE & RTC products • Applicable food hygiene and safety standards
Machine Operator and Packers	4	A Pick-Fill-Seal Machine Operator is responsible for preparing and operating the packaging equipment to pack the Ready to Eat (RTE)	**A Pick-Fill-Seal Machine Operator must be able to:** • Prepare and operate the packaging equipment

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
		and Ready to Cook (RTC) products. The individual also labels them.	• Carry out maintenance of the packaging equipment • Label the packaged RTE and RTC products **A Pick-Fill-Seal Machine Operator must know and understand:** • Criteria for the selection of appropriate packaging material for RTE and RTC products • Various methods and techniques of packaging processed food products • Process of operating relevant packaging equipment • How to perform general maintenance of the packaging equipment

Table 181: RTE & RTC Products: Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Pre Processing and Machine Operator: Slicing; grading; preparation for processing, etc
- Packers: Hygienic way of handling products while packing and also the knowledge on SKUs by product portfolio

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company.
- Pre-Processing & Machine Operator – Basic skill to Select the appropriate raw materials required for production of RTE and RTC products, carry out cleaning, grading, peeling,
- Packers: Skills to prepare and operate the packaging equipment, Label the packaged RTE and RTC products, carry out maintenance of the packaging equipment

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning, Food Safety & Hygiene, Packaging Trends and in Industry 4.0.

17.9 SOYA PROCESSING

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Soya Seed Cleaner & Pre-Processor	3	A Soya Seed Cleaner & Pre-Processor is responsible for carrying out various labor-intensive activities such as cleaning and grading soya, feeding soya in dry beans tank, etc.	**A Soya Seed Cleaner & Pre-Processor must be able to:** • Clean and grade soybean • Feed soybean in dry beans tank **A Soya Seed Cleaner & Pre-Processor must know and understand:** • Appropriate handling of soybeans • Applicable cleaning and grading standards for soybean
Soya Milling Machine Operator	4	A Soya Milling Machine Operator is responsible for preparing and operating milling machine to mill soya to process required products. The individual also carries out general maintenance of the milling machine.	**A Soya Milling Machine Operator must be able to:** • Prepare the milling machine for operation • Carry out general maintenance of the milling machine **A Soya Milling Machine Operator must know and understand:** • How to operate and maintain a milling machine • Applicable food hygiene and safety standards

Table 182: *Soya Processing: Job roles that could be potentially considered for the PMFME scheme*

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Pre Processing and Machine Operator: Labor-intensive activities such as cleaning and grading soya, feeding soya in dry beans tank and operating the milling machine

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company.
- Pre-Processing & Machine Operator – Basic skill to Clean and grade soybean, Feed soybean in dry beans tank & Prepare the milling machine for operation and Carry out general maintenance of the milling machine.

17.10 SPICES

The job roles that could be potentially considered have been mentioned in the table below:

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
Helper / Floor Cleaner / Loader & Unloader	3	A Helper / Floor Cleaner / Loader & Unloader is responsible for carrying out various labor-intensive activities such as loading/unloading and storing the supplies; packing products; maintaining the storage area along with other relevant activities under supervision.	**A Helper / Floor Cleaner / Loader & Unloader must be able to:** • Load and unload supplies. • Maintain cleanliness in the processing and storage area. • Store the supplies appropriately. • Pack the products as per the packaging standards when required. **A Helper / Floor Cleaner / Loader & Unloader must know and understand:** • Applicable food safety and hygiene standards. • Appropriate handling of food supplies and products.
Grader & Sorter	3	A Grader & Sorter is responsible for carrying out various labour-intensive activities such as grading and storing the supplies under supervision.	**A Grader & Sorter must be able to:** • Load and unload supplies • Maintain cleanliness in the work area and storage area • Store the supplies appropriately • Pack the products as per the packaging standards **A Grader & Sorter must know and understand:** • Applicable food safety and hygiene standards

Job Role	NSQF Level	Brief Description	Key Activities & Knowledge Required
			• Appropriate handling of food supplies and products
Grinding & Blending Machine Operator	4	A Grinding & Blending Machine Operator is responsible for preparing and operating processing machineries such as spice grinder, spice pulveriser etc. The person is also responsible for the general maintenance of various machineries.	**A Grinding & Blending Machine Operator must be able to:** • Prepare the work area and machineries for processing spices • Operate the spice processing machineries • Perform general maintenance of the machineries **A Grinding & Blending Machine Operator must know and understand:** • Use of different types of machineries used in spice processing plant such as spice grinder, spice pulveriser etc. • How to perform general maintenance of the machineries
Pouch Packaging Machine Operator	4	A Pouch Packaging Machine Operator is responsible for preparing the work area and packaging machineries; operating the packaging machineries and performing general maintenance of the packaging machineries.	**A Pouch Packaging Machine Operator must be able to:** • Maintain cleanliness in the work area • Prepare filling and sealing equipment • Operate and maintain the Pouch Packaging machine along with filling and sealing equipment **A Pouch Packaging Machine Operator must know and understand:** • Use of different types of equipment used for packaging spices • General maintenance of various packaging equipment

Table 183: Spices: Job roles that could be potentially considered for the PMFME scheme

To start with, these units may not have requirement of the individual roles as mentioned above. They would need a combination of the above roles to be performed by the limited staff that they might have. Our interviews with industry have given us the following mixed job roles as given below -:

- Manual Labour - Helper / Floor Cleaner / Loader & Unloader
- Pre Processing and Machine Operator: Cleaning , grading and sort , and then grind and blend the required spices
- Packers – Pack the spices in the spice using the packing machine

The skills needed for these job roles would be -:

- Food Safety & Hygiene Training (All employees) – Basic training which covers details on the food safety policies and standards in any food processing plant. This training should be made mandatory for all the employees working in the company.
- Pre-Processing & Machine Operator – Basic skill grade and sort the spices, Skill to prepare and operate processing machineries such as spice grinder, spice pulveriser etc
- Packers: Skill to operate the pouch packaging machine and performing general maintenance

The Owners and Proprietors of these firms would need Training on Entrepreneurship Skills, Business Planning and Food Safety & Hygiene.

Chapter 18: EMPLOYMENT GENERATION POTENTIAL SUMMARY

18.1 Employment generation potential forecast from the 11 Sub sectors of Interest to the Feedback Study

No of Units in Food Processing Industry

Feedback had used the ASI data of no of Registered Units in FPI as a starting point. The key point to be noted is the fact that not all sub segments covered under ASI is part of this Study. Additionally, there were certain more sub sectors which were considered as relevant sub segments for this Study. This is explained below in the following tables:

Table 1: ASI estimates of the Registered FPI Units in India till 2017-18 and based on the data Feedback estimates for FY 19 and 20

		Annual Survey of Industries (ASI)											*Feedback Estimates*	
Sr. No.	Description	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	CAGR: 2008-18	2018-19	2019-20
1	Processing and preserving of meat	90	85	115	146	140	148	170	148	181	180	8.0%	194	210
2	Processing and preserving of fish, crustaceans and molluscs and products thereof	352	359	436	390	462	466	427	534	535	538	4.8%	564	591
3	Processing and preserving of fruit and vegetables	709	832	1,052	1,078	1,110	1,101	1,133	1,192	1,254	1,256	6.6%	1,338	1,426
4	Manufacture of vegetable and animal oils and fats	2,429	2,421	3,307	3,394	3,312	3,300	3,240	3,147	3,112	3,044	2.5%	3,121	3,201
5	Manufacture of dairy products	1,100	1,112	1,493	1,653	1,695	1,753	1,783	1,943	2,039	2,064	7.2%	2,213	2,374
6	Manufacture of grain mill products	13,464	13,397	17,792	18,244	18,131	18272	18,953	19,141	18,899	19,060	3.9%	19,810	20,591
7	Manufacture of starches and starch products	589	670	757	766	723	7,44	699	670	629	528	-1.2%	522	515
8	Manufacture of bakery products	993	1,056	1,450	1,399	1,519	1,498	1613	1,626	1,767	1,758	6.6%	1,873	1,996
9	Manufacture of sugar	733	744	895	906	859	791	763	780	741	731	0.0%	731	731
10	Manufacture of cocoa, chocolate and sugar confectionery	456	466	509	560	539	505	594	564	594	703	4.9%	738	774
11	Manufacture of macaroni, noodles, couscous and similar farinaceous products	61	51	83	75	129	105	91	89	118	118	7.6%	127	137
12	Manufacture of prepared meals and dishes	45	139	343	416	352	298	277	364	323	364	26.1%	459	579
13	Manufacture of other food products n.e.c.	4,290	4,225	5,114	5,101	5,251	5,546	5,765	5,983	6,300	6,500	4.7%	6,807	7,129
14	Manufacture of prepared animal feeds	547	606	677	755	873	820	881	918	976	989	6.8%	1,056	1,128
15	Distilling, rectifying and blending of spirits; ethyl alcohol production from fermented materials	291	296	325	378	365	369	395	376	414	408	3.8%	424	440
16	Manufacture of wines	79	69	74	77	78	71	74	70	77	88	1.2%	89	90
17	Manufacture of malt liquors and malt	96	117	154	141	154	143	153	150	123	142	4.4%	148	155
18	Manufacture of soft drinks; production of mineral waters and other bottled waters	896	834	1,264	1,401	1,483	1,520	1,597	1,624	1,658	1,691	7.3%	1,815	1,947
Total		**27,220**	**27,479**	**35,840**	**36,880**	**37,175**	**37,450**	**38,608**	**39,319**	**39,740**	**40,162**	**4.4%**	**42,030**	**44,013**

Table 184: ASI estimates of the Registered FPI Units in India till 2017-18 and based on the data Feedback estimates for FY 19 and 20

Table 2: Shortlisting sub sectors which are of relevance to the study

		Annual Survey of Industries (ASI)										*Feedback Estimates*		
Sr. No.	**Description**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**CAGR: 2008-18**	**2018-19**	**2019-20**
1	Processing and preserving of meat	90	85	115	146	140	148	170	148	181	180	8.0%	194	210
2	Processing and preserving of fish, crustaceans and molluscs and products thereof	352	359	436	390	462	466	427	534	535	538	4.8%	564	591
3	Processing and preserving of fruit and vegetables	709	832	1,052	1,078	1,110	1,101	1,133	1,192	1,254	1,256	6.6%	1,338	1,426
4	Manufacture of vegetable and animal oils and fats	2,429	2,421	3,307	3,394	3,312	3,300	3,240	3,147	3,112	3,044	2.5%	3,121	3,201
5	Manufacture of dairy products	1,100	1,112	1,493	1,653	1,695	1,753	1,783	1,943	2,039	2,064	7.2%	2,213	2,374
6	Manufacture of grain mill products	13,464	13,397	17,792	18,244	18,131	18272	18,953	19,141	18,899	19,060	3.9%	19,810	20,591
8	Manufacture of bakery products	993	1,056	1,450	1,399	1,519	1,498	1613	1,626	1,767	1,758	6.6%	1,873	1,996
11	Manufacture of macaroni, noodles, couscous and similar farinaceous products	61	51	83	75	129	105	91	89	118	118	7.6%	127	137
12	Manufacture of prepared meals and dishes	45	139	343	416	352	298	277	364	323	364	26.1%	459	579
Total		**19,243**	**19,452**	**26,071**	**26,795**	**26,850**	**26,941**	**27,687**	**28,184**	**28,228**	**28,382**		**29,701**	**31,104**

Sub sectors such as Cold Chain, Beverages (Tea & Coffee), Spices (Blended), Soya Products are not included in ASI

Table 185: Shortlisting sub sectors which are of relevance to the study

Table 3: Universe estimation of sub sectors not listed in ASI data

Other sub-sectors considered in Feedback study, for which ASI doesn't show the registered FP units	No. of FPI units in India (FY'20)	Sources Referred
Cold Chain (incl. Cold Storages, Refer Trucks and Pack Houses)	7,600	1. Cold Storage units – 8,186 nos, Source : https://pib.gov.in/PressReleasePage.aspx?PRID=1658114 (Dated 23 Sept 2020)- translating into ~ 7,000 companies as per industry experts 2. Refer trucks units – 18,000 units, Source : All India Cold-chain Infrastructure Capacity (AICIC-2015) carried out by NABARD Consultancy Service (NABCONS) states 9,000 units in 2014- 15, industry experts believe the current installed base to be around 18,000 units translating into 300 companies 3. Pack houses – 300 nos, Source : https://apeda.gov.in/apedawebsite/Announcements/Active_Pack_House_list_jan_2021.pdf states it as 207 units under APEDA, industry experts believe there could be around 300 pack houses in India, including those outside the purview of APEDA, translating to 300 companies Overall, we have considered 7,600 companies under Cold Chain segment – addition of 1+2+3
Beverages (Tea & Coffee)	1,075	Beverages (Tea & Coffee) -923 Units in Tea Manufacturing as per 2018-19 Tea Board Annual report page 69 - http://www.teaboard.gov.in/pdf/65th_Annual_Report_2018_19_Eng_pdf874.pdf; Coffee - 85 Licensed Cofee Curing works as per Jan 2021 India Coffee Board Database - https://www.indiacoffee.org/Database/DATABASE_Jan2021.pdf
Spices	1,063	Spices - Blended Spices manufacturing Units estimate based on Feedback past study in 2016/17 and validated with Spices Board and SME interviews.
Soya processing	165	Soya Processing - Soyabean Processing Assoication website has a list of 115 members - https://www.sopa.org/solvent-extraction-plant-having-refineries/; We spoke with SOPA Secretary and validated the no of units to 165 in India. Secondly, Indian Council of Agricultural Research' Establishment of Soybean Processing Industries: Entrepreneurship Development Programme website states the no of Soybean processing units as 198 in India - https://icar.gov.in/content/establishment-soybean-processing-industries-entrepreneurship-development-programme-0
Total No. of registered FPI units considered for sectors where data was not listed in ASI	**9,903**	

Table 186: Universe estimation of sub sectors not listed in ASI data

Table 4: Final Universe estimates of all sub sectors of relevance to the Feedback Study

Sub Sectors	Estimated no of Registered FPI Units (FY'20)	Sources used
Bread and Bakery products	1,996	As per ASI Estimate & Feedback projection for FY 2019-20
Dairy Products	2,374	As per ASI Estimate & Feedback projection for FY 2019-20
Fish & seafood processing	591	As per ASI Estimate & Feedback projection for FY 2019-20
Fruits & Vegetables processing	1,426	As per ASI Estimate & Feedback projection for FY 2019-20
Meat & Poultry processing	210	As per ASI Estimate & Feedback projection for FY 2019-20
Milling (Grains & Oilseeds)	23,792	As per ASI Estimate & Feedback projection for FY 2019-20
Ready-to-eat & Ready-to-cook products	716	As per ASI Estimate & Feedback projection for FY 2019-20
Cold Chain (incl. Cold Storages, Refer Trucks and Pack Houses)	7,600	Govt. Departments : National Horticulture Board (NHB), National Horticulture Mission (NHM) & Ministry of Food Processing Industries (MoFPI) & NABCONS report PIB release (Sept 2020), Agricultural and Processed Food Products Export Development Authority (APEDA)
Beverages (Tea & Coffee)	1,075	2018-19 Tea Board Annual report page 69; Jan 2021 India Coffee Board Database
Spices	1,063	Estimate based on Feedback past study in 2016/17 and validated with Spices Board and SME interviews.
Soya processing	165	Soybean Processors Association of India (SOPA(,Indian Council of Agricultural Research' Establishment of Soybean Processing Industries: Entrepreneurship Development Programme website
Total No of FPI units	**41,008**	

Table 187: Final Universe estimates of all sub sectors of relevance to the Feedback Study

Processing Volumes & Investment required:

To summarize, total processing volume across the 10 sub-sectors (Cold chain has not been included in the processing volumes) of interest has been estimated at approx. 96 MMT in FY'20. The processing volume likely to increase at a CAGR of 7.5% to reach approx. 198 MMT by FY'30. Considering 80% capacity utilization, creation of this additional processing capacity will require investment to the tune of approx. Rs. 3.22 Lakh Crores[57]. The below table depicts the likely growth in processing capacity for individual sub-sector between FY'20 and FY'30 and investment required.

Sub-Sector	FY'20 Processing Volume ('000 MT)	FY'30 Processing Volume ('000 MT)	CAGR	Approx. investment required (Rs. Cr.)
Dairy Products	40,835	1,02,000	9.60%	1,66,500
Milling	21,795	28,050	2.60%	35,367
Soya Processing	18,350	34,000	6.40%	5,135
F&V Processing	8,542	17,500	7.40%	20,996
Bread & Bakery Products	3,675	8,750	9.10%	47,578
Meat & Poultry Processing	1,752	5,024	11.10%	12,268
Beverages (Tea & Coffee)	1,516	2,450	4.90%	4,379
Spices	185	620	12.90%	16,304
RTE & RTC Products	135	459	13.00%	12,163
Fish & Seafood Processing	26	101	14.40%	1,861
Total	**96,811**	**1,98,954**	**7.5%**	**3,22,552**

Table 188: Overall Processing Volumes (FY '20 & FY'30) & Approximate Investment Required

Source: Feedback Analysis

Other than the above investment, approx. Rs. 4,800 Cr. investment would be required to create necessary Cold Chain infrastructure – Cold Storage, Reefer Trucks & Pack Houses.

Based on the research conducted, there are approx. 41,008 companies are involved in the Registered Food Processing segment of the above sub-sectors. These companies employ approx. 14.6 Mn people in FY'20. Below table depicts universe of companies in each sub-sector and employment estimates for each sub-sector in FY'20.

Sub-Sector	FY'20 Universe (No. of Companies)	FY'20 - No. of Employees
Milling	23,792	4,82,418
Cold Chain	7,600	2,24,300

[57] Estimations based on Feedback Analysis of each of these 10 sub sectors explained in detail in each sub sector report.

Sub-Sector	FY'20 Universe (No. of Companies)	FY'20 - No. of Employees
Dairy Products	2,374	2,02,240
Bread & Bakery Products	1,996	1,35,233
Beverages (Tea & Coffee)	1,075	1,05,100
Fish & Seafood Processing	591	94,835
F&V Processing	1,426	88,258
RTE & RTC Products	716	51,085
Spices	1,063	40,750
Meat & Poultry Processing	210	31,296
Soya Processing	165	6,075
Total	**41,008**	**14,61,590**

Table 189: Overall Universe of companies and Number of employees' estimates for each sub-sector (FY'20)

Source: Feedback Analysis

In Dairy, only 20% of the milk is currently processed by the Organized sector. Rest are either locally consumed or used by the unorganized sector for further selling or production of value-added product. Only organized Dairy processing has been considered in the above calculation. Similarly, current processing levels in Meat & Poultry industry and in F&V industry are only 20% and 3% respectively and the rest are sold as unprocessed. Also, within the Bread & Bakery segment the home institutions and retail bakeries have not been considered. Across Sectors, only the employees involved into processing have only been considered for the above calculation.

Going forward, it has been estimated that these 11 sub-sectors will generate approx. 13.4L jobs between FY'20 and FY'30 to reach 28.02L persons by FY'30.

Sub-sector wise Employment Generation Potential between FY'20 and FY'30

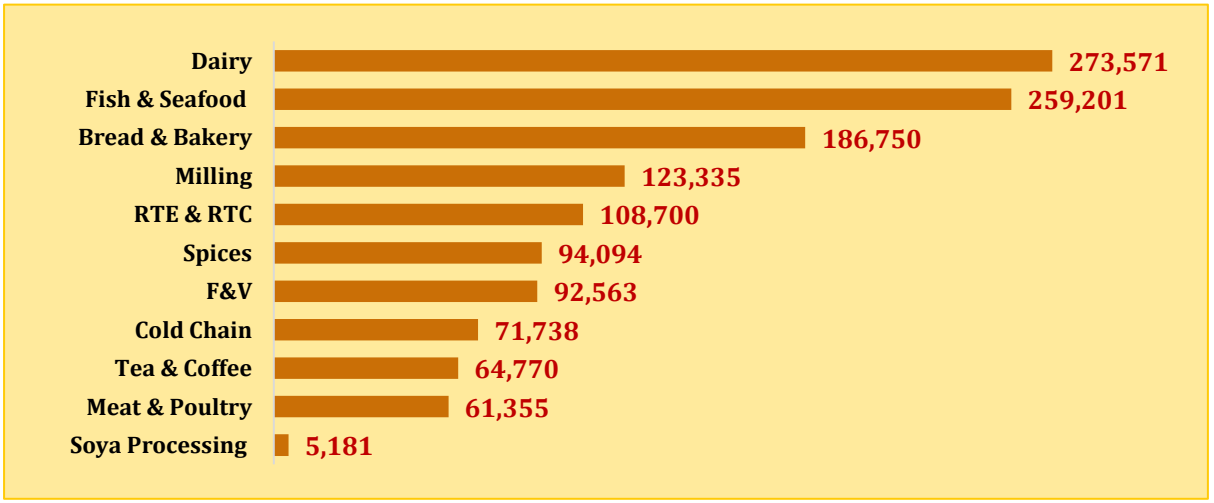


Figure 201: Sub-sector wise Employment Generation Potential between FY'20 and FY'30

Employment Generation Potential split by States

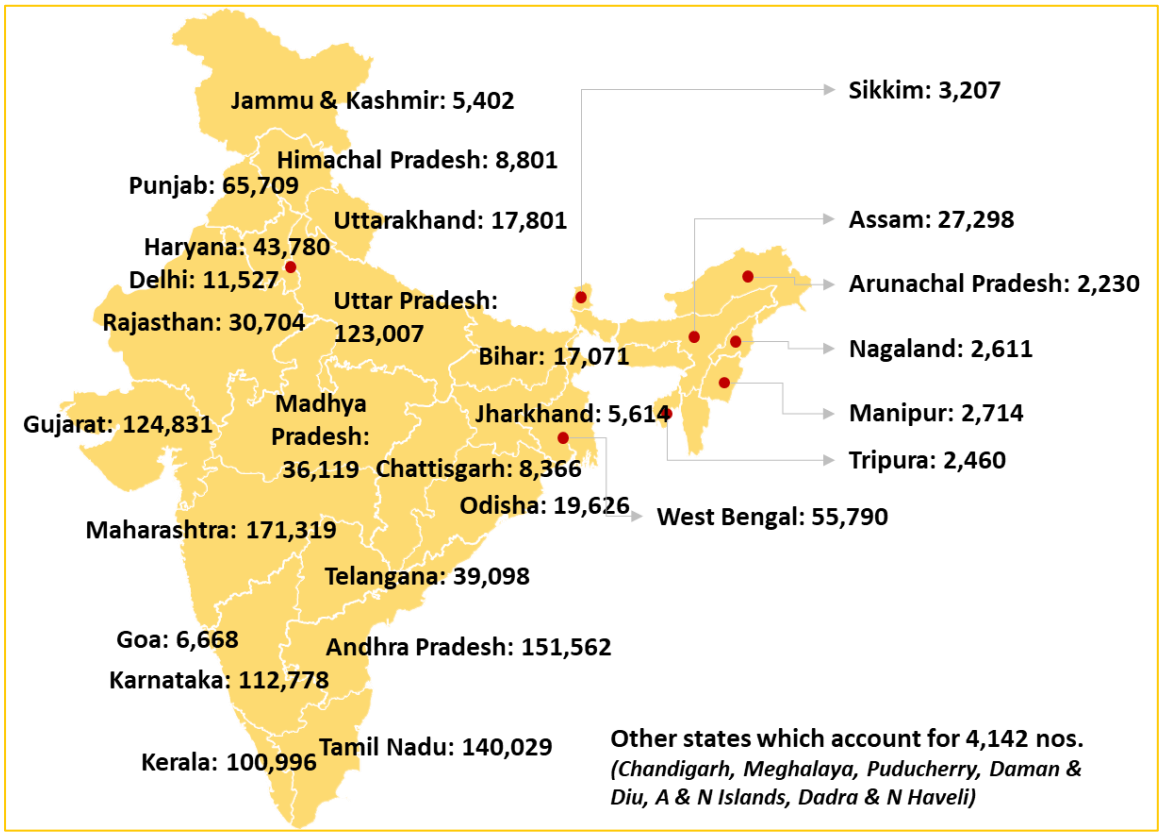


Figure 202: Employment Generation Potential: By States

Source: Feedback Analysis

Chapter 19: Impact of Industry 4.0 on the Food Processing Sector and Skills

19.1. Introduction:

Automation levels in manufacturing set ups are classified by the usage of various products and services at different levels of Automation Investments made in a plant. These various levels and their classification are set out below:

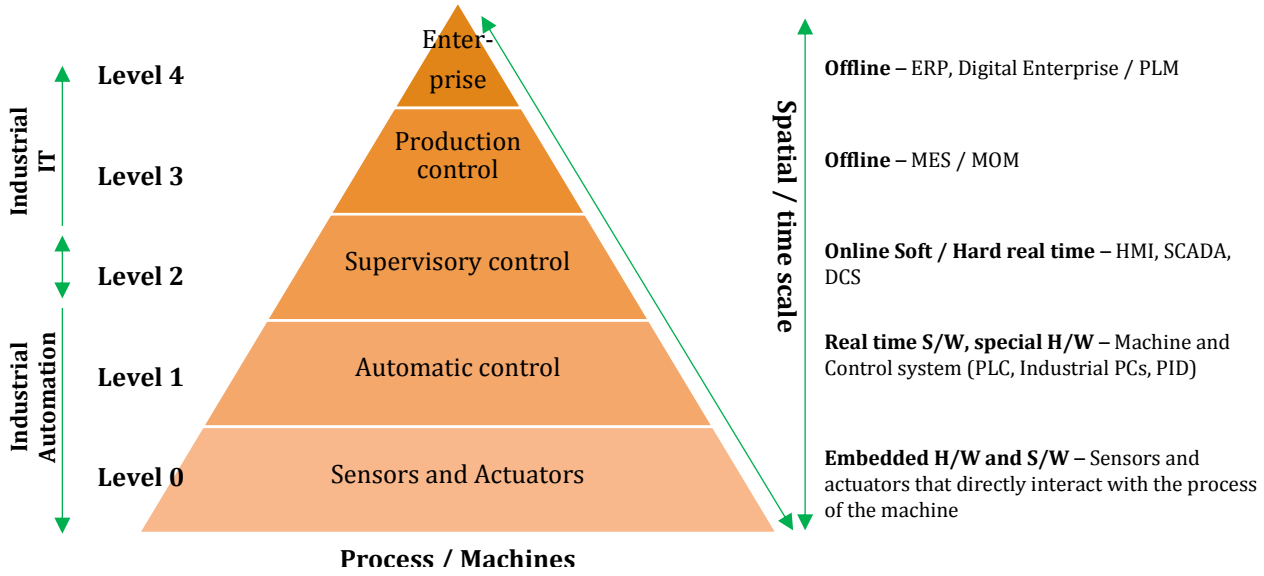


Figure 203: Automation: Levels and their classification

Industry 4.0 refers to the Level 4 Automation shown in the above chart. "Industry 4.0" refers to the digitization of manufacturing and the increasing digital connectivity of product, process, and factory. The new manufacturing technologies allow for greater communication between machines, and machine-level processing of data allows them to adapt instantly to new production requirements. It also refers to the connecting of information systems and sharing of data across the supply chain to improve efficiency.

Industry 4.0 offers opportunities for greater efficiencies in energy consumption, real-time yield optimization, and other processes that can be mined from the heaps of data it generates,

19.2. Automation in Food Processing sector:

Feedback Consulting had undertaken a major study on F&B Industry Automation for a German Major in 2019. We present below a few glimpses from this report which indicates the level of Automation and the status of Industry 4.0 in the Food Processing Sector.

Automation products spend norms (with respect to the Project Cost) across large, medium, and small players in the Food Processing Sector:

Segment of Interest	Large	Medium	Small
Dairy	**7.4%**	5.7%	4.7%
Rice Mills	**6.9%**	5.6%	4.0%
Brewery	**7.3%**	6.4%	4.9%
Distillery	**8.3%**	7.8%	6.8%
Edible Oil	**7.5%**	6.6%	4.2%
Confectionery	**7.5%**	5.2%	4.2%
Overall- Average Spend Norms	**7.3%**	5.9%	4.8%

Table 190: Automation products spend norms

Source: Feedback Analysis

Near 75-80% of the spend on Automation in the Food Processing Sector is mainly done by Large and medium firms and very low levels of Automation is seen in Smaller and Micro players.

The spends on various elements of Automation in the Food Processing Sector is shown below:

Segment	Drives	Motors	Robotics	PLC	DCS	MES	EMS	LV Products	% Contribution (Overall)
Dairy	1.6%	1.3%	0.3%	0.9%	1.0%	0.3%	0.2%	1.8%	7.4%
Rice mills	1.6%	1.4%	0.0%	0.8%	0.9%	0.3%	0.2%	1.7%	6.9%
Brewery	1.8%	1.7%	0.0%	0.9%	1.0%	0.3%	0.2%	1.4%	7.3%
Distillery	2.0%	1.8%	0.0%	1.1%	1.2%	0.3%	0.2%	1.7%	8.3%
Edible Oil	1.9%	1.7%	0.0%	0.9%	1.0%	0.3%	0.2%	1.5%	7.5%
Confectionery	1.7%	1.4%	0.5%	0.9%	1.0%	0.3%	0.2%	**1.5%**	7.5%
Overall	**1.7%**	**1.5%**	**0.2%**	**0.9%**	**1.0%**	**0.3%**	**0.2%**	**1.5%**	**7.3%**

Table 191: Spend levels on various elements of Automation in the Food Processing Sector

Source: Feedback Analysis

The latest automation developments in the F&B industry include:

- The major automation applications in the food & beverage industry have been observed in the supply chain and logistics segment.

- The focus is more on packaging, storage and distribution management. An automated storage and retrieval system is one of the most successful processes to efficiently automate warehousing.

- A growing trend is the automation of packaging lines to improve the speed and accuracy of packing.
- Other areas of automation in the food and beverage industry are quality testing/inspection and integration of all machines into a SCADA or PLC-based controllers that can be remotely controlled and monitored to improve manpower productivity and reduce process deviations.

Benefits of Automation

The industry handles large volumes of products, and to produce high-quality and consistent products for the export market and the domestic consumption, the large players in the food processing segment have gradually started implementing automation in their plants.

Following are the key benefits experienced by Food processing companies due to automation:

Increase productivity

- Industry 4.0 and IoT integration support manufacturing systems to generate necessary analytics to self-correct the processes. For example, the IoT indicates the machine idle time which can be analysed to experiment higher machine running time, higher productivity, higher manpower, etc.
- Similarly, Machine Learning, Artificial Intelligence and cloud computing help with real-time analysis and quick decision-making.

Increase efficiency

- Predictive maintenance comes along with automation. Real-time data is used to identify potential issues and alerts when maintenance is needed, further eliminating production downtimes.
- By aggregating the data gathered, it is possible to gain far greater insight into how a machine is performing and where the manpower has to put their efforts for better efficiency and productivity and how to optimize the operations, etc.

Emphasis on Personnel Safety

- When hazardous tasks such as handling heavy objects and other potentially dangerous or monotonous tasks are performed by automation solutions, the safety of the human workforce are addressed.

Improved Traceability

- Automation significantly improves product (raw materials or finished products) traceability, which provides valuable data to manufacturers to ensure regulatory compliance.
- This data also helps in identifying and solving the issues in the supply chain, thus supporting continuous enhancement of overall quality & safety.

19.3. Impact of Industry 4.0 / IoT / Automation in Food Processing Sectors

Parameter	Impact	Level of Impact	Current Adoption Level	
			Large / Branded / Organized Players	Micro, Small & Medium Players
Manufacturing	Exploring automation and predictive maintenance to reduce manual errors and improve efficiency	High	Medium to high	Low
Regulatory	FSSAI compliances for label claims, packaging, freshness, along with impetus to processing under Make in India and SAMPADA schemes	High	High	Medium
Demand Forecasting	Scale up capacity in-line with demand through predictive analytics and use of IoT to be able to react to demand fluctuations	Medium to High	Medium	Low
Distribution	IoT allows real-time connectivity between processing facility and distributors which would allow the product to get to market faster and retain quality	Medium to High	Medium	Low

Table 192: *Automation in Food Processing - Current Adoption Level*

Micro, Small & Medium enterprises in the food processing sector are still hesitant to invest in computing applications that can allow proper measurement, tracking & analysis of data. Computing applications like ERPs, CRM, Supply chain visibility etc help provide factual data that not only enables better decision making but also lead to better productivity.

Large companies that have adopted these technologies have certainly benefitted and have experienced a visible enhancement in their profitability.

19.4. Plant automation level by Sub-Sectors

Sub-Sectors (Food Processing – Manufacturing)	Current Adoption Level			
	Large	Medium	Small	Micro
Bread and Bakery products	*High*	*Moderate*	*Low*	*Low*
Dairy Products	*High*	*High*	*Low*	*Low*
Fish and seafood processing	*Moderate*	*Low*	*Low*	*Low*
Fruits & Vegetables processing	*High*	*Moderate*	*Low*	*Low*
Meat & Poultry processing	*Moderate*	*Low*	*Low*	*Low*
Milling (Grains & Oilseeds)	*Moderate*	*Moderate*	*Low*	*Low*
Beverages	*High*	*Moderate*	*Low*	*Low*
RTE / RTC Products	*High*	*High*	*Moderate*	*Low*
Soya processing	*High*	*Moderate*	*Low*	*Low*
Spices	*High*	*Moderate*	*Low*	*Low*

Table 193: Plant automation - Current Adoption Level

Source: Feedback Analysis

The most important aspects considered by firms for adapting Industry 4.0 Solutions in the Food Processing Sector is described in the chart below:

Figure 204: *Factors considered by firms for adapting Industry 4.0 Solutions*

In the post-COVID era, Indian food processing manufacturing are likely to be much more digital, as is already evident in the immediate response to the crisis. It was evident that COVID-19 has had a lower impact wherever factory automation had already been incorporated in food production lines and a high impact in places where there is operator-intense work due to norms of maintaining social distancing etc.

So, in a way, the onset of the pandemic has accelerated the Industry 4.0 revolution and has brought many innovative solutions by integrating the machine data and analysing them for efficiency improvements.

Technology applications across the value chain can help reduce wastage, maintain quality, and enhance shelf life of food products. In a price sensitive market dominated by unorganized and small players, technology has taken a back seat.

Traditionally dominated by imports, food processing equipment market is likely to see an increased demand.

Digitalized supply chain, smart warehousing and logistics using industry 4.0 technologies can help India reduce wastage during storage and transit. Intelligent supply chain management systems can help reduce wastage for perishables.

A stable and sustainable ecosystem for startups in food processing is critical to driving food innovation and expedited the growth. Innovative products focused on wellness, health and nutrition are likely to see a huge opportunity in the domestic market.

19.5. Skill Enhancement needs for Industry 4.0 in Food processing

Automation and robotics in the food and beverage industry in India are not being widely applied but are heading in that direction, especially as the sector transforms in terms of demand and becomes a multi-brand market.

There is quite a bit of speculation whether increasing automation will replace people, leading to most to view that it won't replace people, but the skill sets in them.

Skill sets needed are -:

- For companies planning automation – Most small and micro units across sub sectors do not have high degree of automation as described above. But this is likely to change, and Automation and Industry 4.0 will be part of FP manufacturing in the years to be come. Such units will need the following skill training currently:
    - Basic Computer education for all employees above NSQF Level 3 and above
    - Basic understanding of automation and types of technologies
    - Industry 4.0 basics
- For companies moving from automation to Industry 4.0
    - Increasing automation will help in manpower rationalization by identifying non-productive activities, thereby making informed decisions through means of data and digital interventions and allowing people to upgrade their skill sets for more productive roles.
    - Major challenge in this technology adoption is the mandatory training on these technology to the existing employees to cope-up with the same. Like how FSSAI made the mandatory training for Ensuring food safety and hygiene (FOSTAC), training on technology has to be mandatory for faster adoption.
    - Quality certifying companies like TUV SUD in collaboration with CII have started short term training programs for manufacturing sectors in India (incl. Food Processing Industries) primarily to upskill the existing employees.
    - Apart from TUV SUD, the equipment suppliers and technology providers like Siemens, Buhler, etc. are offering training to their customers. This is also again to upskill the existing employees. There is a huge gap in training the freshers in the industry with the technology changes as the curriculum followed in the formal training needs frequent updates.

Chapter 20: Packaging Trends in Food Processing Sector and impact on Skills

20.1. Industry overview of the Packaging Sector in India

The Indian Packaging industry is currently valued at USD 50 bn in 2019 and is expected to reach USD 200 bn by 2025. The Packaging Industry in India is riding on a high wave courtesy of Food processing sector. The industry has demonstrated a growth in the tune of double digits over the last 5 years and is expected to continue the momentum of growth over the next 10 years as well.

The Food processing sector is the largest consumer of packaging at 45% by total value contribution of the Packaging Industry in India. While the overall demand from Food processing segment is estimated at USD 22 bn the segments of interest such as bread and bakery, dairy products, fish and sea food processing, fruits and vegetables, meat and poultry, milling, beverages, RTE, Soya Processing, spices would potentially account for 60% of the USD 22 bn market value.

Packaging industry has been a complementary industry to the Food Processing sector. There have been tremendous innovations over the years for packaging of processed food. These innovations have had a positive impact on the overall ecosystem players including the raw material providers, packaging machine suppliers and food processing industries themselves.

Packaging is pivotal to ensuring the processed food is packed in the right packaging solution and is supplied through defined supply chain and is consumed by the consumer as it is intended to. Considering the challenges involved in the delivery mechanisms to reach to the customer in the right form, packaging solution becomes even more critical to mitigate this aspect. There are various factors which influence the type of packaging solutions which is used for different type of processed food applications. The key factors which govern the type of packaging solutions include moisture barrier, oxygen barrier, odour control along with desired shelf life of the processed food. Most of the packaging formats are either flexible in nature with the use of Paper / Plastics or use rigid format of packaging with either Plastics / Metals / Glass materials. Packaging is a combination of science, art and technology, which not only adds self-life to a food product, but also adds to the value of the product.

Packaging has created a way for higher volumes of processed food to enter the organized value chain and has created opportunities for local, regional firms to create a brand for themselves in their respective markets. There has been a large volume of conversion from non-packed food to food which can be packed and supplied and hence the related growth opportunity for higher volume growth for the processed food industry.

Packaged food product companies are focusing on packaging materials that support longer shelf-life. A few others are updating their packing designs to include communication around appropriate sanitization.

20.2. Key factors which have been driving some of the key trends in the market

The food processing industry has been closely regulated by agencies such as FSSAI (Food Safety and Standards Authority of India) who have been instrumental in setting out the standards along with the compliance and inspection norms related to end-to-end manufacturing and packing process to be followed by the food processing units.

Some of the key guidelines set out by FSSAI for Packaging include:

- Containers used in packaging made of metal should not be rusty, enameled containers which have not become chipped and rusty should be properly tinned, containers made of aluminum conforming in chemical composition to IS:20
- Containers made of plastic materials should conform to the Indian Standards Specification, used as appliances or receptacles for packing or storing whether partly or wholly, food articles namely –
    - IS: 10146 (Specification for Polyethylene in contact with foodstuffs).
    - IS: 10142 (Specification for Styrene Polymers in contact with foodstuffs).
    - IS: 10151 (Specification for Polyvinyl Chloride (PVC), in contact with foodstuffs).
    - IS: 10910 (Specification for Polypropylene in contact with foodstuffs).
    - IS: 11434 (Specification for Ionomer Resins in contact with foodstuffs).
    - IS: 11704 Specification for Ethylene Acrylic Acid (EAA) copolymer.
    - IS: 12252 - Specification for Poly alkylene terephathalates (PET).
    - IS: 12247 - Specification for Nylon 6 Polymer.
    - IS: 13601 - Ethylene Vinyl Acetate (EVA).
    - IS: 13576 - Ethylene Metha Acrylic Acid (EMAA).

FSSAI has also set out some details specific to the food products as well. Few examples as stated below:

Food Product Category	Specific Packaging Requirements
Milk and Milk Products	(*a*) Bottling or filling of containers with heat-treated milk and milk product shall be carried out mechanically and the sealing of the containers shall be carried out automatically. (*b*) Wrapping or packaging may not be re-used for dairy products, except where the containers are of a type which may be re-used after thorough cleaning and disinfecting. (*c*) Sealing shall be carried out in the establishment in which the last heat-treatment of drinking milk or liquid milk-base products has been carried out, immediately after filling, by means of a sealing device which ensures that the milk

Food Product Category	Specific Packaging Requirements
	is protected from any adverse effects of external origin on its characteristic. The sealing device shall be so designed that once the container has been opened, the evidence of opening remains clear and easy to check. (*d*) Immediately after packaging, the dairy products shall be placed in the rooms provided for storage
Fruits and Vegetables	(*i*) Every container in which any fruit product is packed shall be so sealed that it cannot be opened without destroying the licensing number and the special identification mark of the manufacture to be displayed on the top or neck of the bottle. (*ii*) For Canned fruits, juices and vegetables, sanitary top cans made up of suitable kind of tin plates shall be used. (*iii*) For Bottled fruits, juices and vegetables, only bottles/ jars capable of giving hermetic seal shall be used. (*iv*) Juices, squashes, crush, cordials, syrups, barley waters and other beverages shall be packed in clean bottles securely sealed. These products when frozen and sold in the form of ice shall be packed in suitable cartons. Juices and Pulps may be packed in wooden barrels when sulphited. (*v*) For packing Preserves, Jams, Jellies, and Marmalades, new cans, clean jars, new canisters, bottles, chinaware jars, aluminum containers may be used, and it shall be securely sealed. (*vi*) For Pickles, clean bottles, jars, wooden casks, tin containers covered from inside with polythene lining of 250 gauge or suitable lacquered cans shall be used. (vii) For Tomato Ketchups and Sauces, clean bottles shall be used. If acidity does not exceed 0.5% as acetic acid, open top sanitary cans may also be used. (viii) Candied fruits and peels and dried fruits and vegetables can be packed in paper bags, cardboard or wooden boxes, new tins, bottles, jars, aluminum and other suitable approved containers. (ix) Fruits and Vegetable products can also be packed in aseptic and flexible packaging material having good grade quality conforming to the standards laid down by BIS.
Canned Meat Products	(*i*) New sanitary top cans made from suitable kind of tin plate shall be used. The cans shall be lacquered internally; they shall be sealed hermetically after filling. The lacquer used shall be sulphur resistant and shall not be soluble in fat or brine. (*ii*) Cans used for filling pork luncheon meat shall be coated internally with edible gelatin, lard or lined with vegetable parchment paper before being filled. (*iii*) Meat products packed in hermetically sealed containers shall be processed to withstand spoilage under commercial conditions of storage and transport.

Table 194: *Specific Packaging Requirements: By segment*

Another important development in the current scheme of things is the way packaging formats have been changing to suit the needs of environmental concerns along with sustainability road map for packaging. This is with respect to the type of materials being used for packaging and the scope for recycling and reusability of the materials.

The regulatory authority MoEFCC (Ministry of Environment, Forest and Climate Change) has introduced Plastic Waste Management Rules first in 2011, followed by various amendments in 2016, 2018. Recently the MoEFCC has issued a draft Plastic Waste Management Rules, 2021 has necessitated a few changes in the country's handling of its plastic waste. This requires producers/brand owners who introduce plastic carry bags, multi-layered plastic sachets, pouches, and packaging into the marketplace to submit an EPR (Extended Producers Responsibility) plan. The rules state that only those multi-layered plastics (MLPs) will be phased out which are non-recyclable or non-energy recoverable or have no alternate use. Also, there will be a central registration system for the registration of the producer/ importer/brand owner. The ban on single use plastics is expected to the implemented from January 2022.

Both FSSAI and MoEFCC have set out guidelines to control the type of packaging materials being used with a view to push use of materials which can be easily recycled, biodegradable or compostable in nature.

To incorporate the sustainability aspects, brand owners / food processing companies have been tweaking their products, marketing strategies and service offerings to cater to the evolving needs of consumers – highlighting what matters most today which is safety, immunity, and health oriented.

The importance of Packaging is such that this has created a parallel industry to that of the many essential sectors and more importantly for the Food Processing Industry. The complexities presented by the food processing sector has successfully created a complementing, support industry in the form of Packaging Industry in India. The industry value chain comprises of raw material manufacturers (Films, Paper, Glass, Metals) followed by packaging product manufacturers who are most commonly referred to as Packaging Converters. The products made by these converters find applications for the processed food.

Most of the packaging research and development is jointly developed and created by large brand owners and the Packaging Converters. Both these entities have a dedicated packaging research and development department which conducts tests and trails to finalise the appropriate design, packaging format and material to be used based on the characteristics of the processed food. These firms employee technologists from the field of food science, material chemistry, supply chain specialists. The food processors are highly dependent on packaging converters to meet their packaging needs from a food essential to sustainable environment point of view. The Packaging Converters play a very critical and are pivotal to the success of processed food industry in India.

20.3. Current level of Skill gaps which are important to be addressed to support the growth of the existing industry road map

The improvements in the packaging development for the food processing industry must be viewed from the point of view of Food Science, Processing Approach, Microbial Technology, Packaging & Sustainability and Supply Chain understanding. Currently, the level of understanding across this value chain is limited to select set of players mainly the large and medium scale firms who are the trend setters in the industry while the micro and small

enterprises either follow the practices of these firms or lack the knowledge and desired skill sets across key functions.

The emerging roles due to improvements in packaging would be mainly in the areas of food technology and enhanced understanding of packaging materials and its sustainability issues. Some of the areas which will need attention from a skill training point view would include:

- Understanding the nature of food products which are to be packed, each type of food products would have different challenges such as perishable nature, odour control, exposure to moisture, etc.
- Deeper understanding on the types of packaging materials which can be used not only from a compliance point of view but from a sustainability perspective as well. The selection of material is key to ensure the type of barrier required by the finished product until it is consumed by the consumer through the supply chain points.
- Improvement from processing point of view and its impact on the finished products, for instance the way the products must be packed like hot fill state, form filling, retort packs, etc.
- There is a need to gain better knowledge on the existing storage and supply chain requirement for the processed food products.
- All of the above should be complemented in imparting the knowledge of criticality of ensuring the nutrient value of the products until consumption by consumers.

Hence, there would be requirement of Food Scientists / Technologist, Nutritionists, Packaging Specialists, Packaging Line Operators, Quality Control Staff across most of the enterprises.

20.4. Key recommendations for the packaging function within the food processing sector

Currently, most of the experienced professionals are either working with the large enterprises or are associated with them in some way or other. This has created a skew towards the pool of available employees limited to the large enterprises and to some extent medium enterprises. It will be important to create a PPP based approach wherein the current employees can participate in an internship program with the IIP (Indian Institute of Packaging) which otherwise runs degree / diploma programs for the packaging executives.

The current R&D is mostly done by CFTRI, DRDO, it will be encouraging to promote partnerships from the food processing firms for co-development programs.

Chapter 21: An Outlook on Food Fortification

Fortification is the addition of key vitamins and minerals such as Iron, Iodine, Zinc, Folic Acid, Vitamins B12, A & D to staple foods such as rice, wheat, oil, milk and salt to improve their nutritional content. These nutrients may or may not have been originally present in the food before processing or may have been lost during processing.

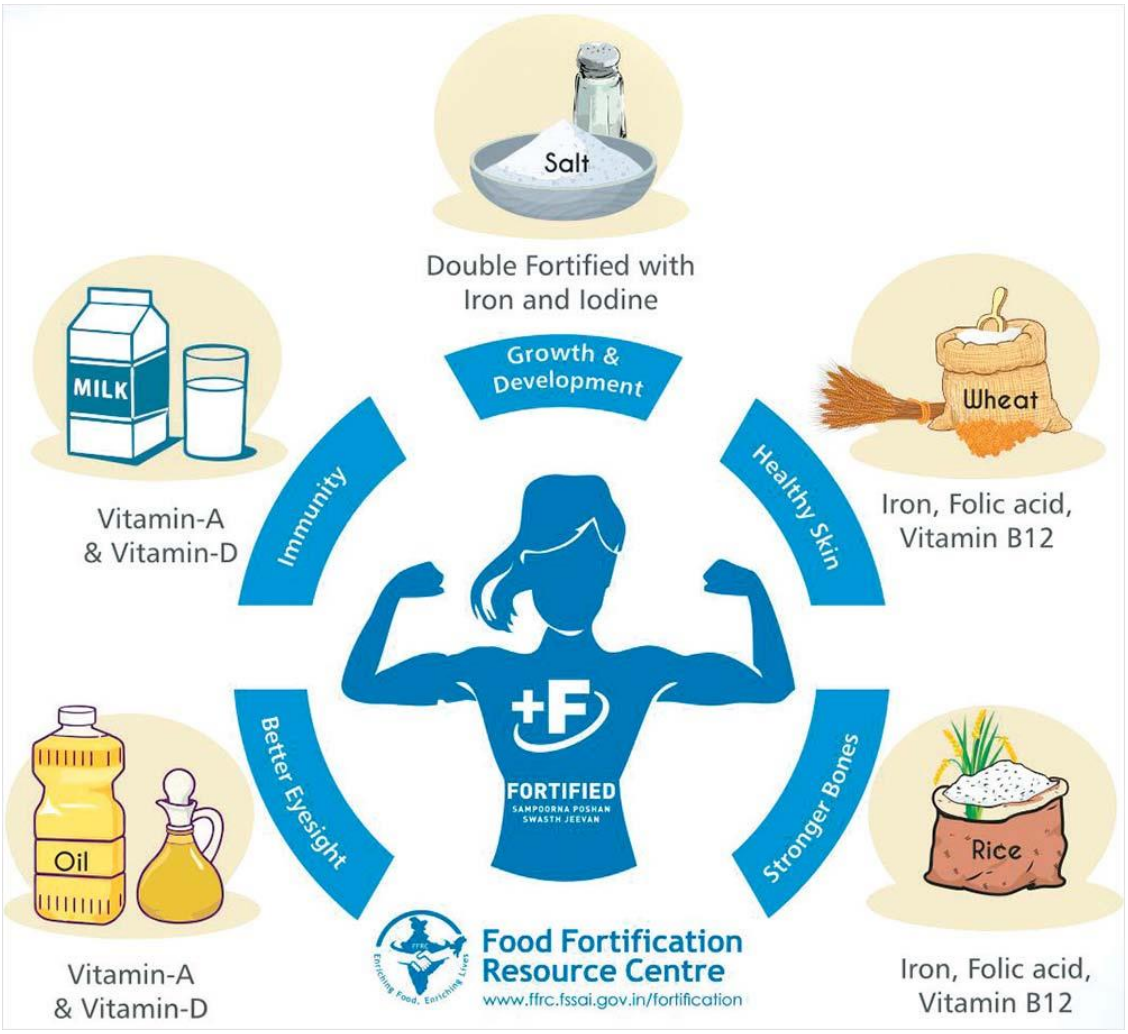


Figure 205: *Food Fortification*

Food fortification is considered as an effective strategy of delivering micronutrients affordably and sustainably to reduce the prevalence of micronutrient deficiency diseases like anaemia, night blindness, neural tube defects, Vitamin D deficiency disorders, etc. Access to safe and nutritious food is a must and sometimes due to lack of a balanced diet, lack of variety in the diet or unavailability of food, one does not get adequate micronutrients. Often, there is considerable loss of nutrients during the processing of food as well.

India has a very high burden of micronutrient deficiencies caused by Vitamin A, Iodine, Iron and Folic Acid leading to Night Blindness, Goitre, Anemia and various birth defects. According to the National Family Health Survey (NFHS-4):

- 58.4% of children (6-59 months) are anemic
- 53.1% women in the reproductive age group are anemic
- 35.7% of children under 5 are underweight

Fortification is a globally proven intervention to address the much prevalent micronutrient deficiencies in the population.

Fortification does present a number of challenges. An ingrained wariness -bordering on suspicion - among the population about 'chemicals' being added to food, poses a challenge to easy adoption. Also, perceived changes to food tastes remains a significant barrier.

One of the biggest challenges of food fortification is that people are unaware of their own micronutrient deficiencies and the seriousness of their consequences, as they may not present themselves in typical forms and are equally unaware of the benefits of eating fortified foods. Many people believe that they do not need vitamins and minerals or that eating a lot of food means that they are consuming all the nutrients they need. By the time they develop health issues because of these deficiencies, it is too late.

Even among people who are aware of food fortification, resistance may be due to misconceptions about fortified foods. Many believe that eating fortified foods may result in an overdose of vitamins and minerals and harm their health. They do not realise that therefore Standards have been set carefully to limit the amount of fortificants in food so that neither too much nor too little of micronutrients are delivered to people. Resistance to using fortified foods can also be present because of misperceptions of change in appearance, cooking properties, taste, or flavour.

The Food Safety and Standards Authority of India (FSSAI) is framing policies and guidelines and is engaging with the food processing industry and food business operators (FBOs) for the fortification of cereals, oil, and milk with suitable micronutrients so that the fortified staples are easily available in the open market and to the state governments for distribution through the Public Distribution System (PDS), Integrated Child Development Services (ICDS) and the Mid-Day Meal (MDM) schemes.

The packaging of fortified products has a blue-coloured +F logo indicating that it is fortified, and the nutrition label on the packed product indicates the various added micronutrients and their quantities, as specified by the FSSAI. Non-fortified products cannot use this logo.

21.1. Food fortification will lead to additional skill sets

Food fortification is a complementary strategy and not a replacement for balanced, diversified diets to address malnutrition. This would mean that there will be need of food technologists as well as nutritionists who would be able to access the level of fortification required for different types of food products.

There could be two approaches to address this skill gap:

- Employee individuals at an organization level especially for large / medium firms
- Set up a pool of food technologists and nutritionists at a cluster level particularly supporting the micro and small enterprises

Chapter 22: Expectations of Training Institutes on Training Infrastructure

Training for food processing sector can be classified as "Formal" and "In-Formal" training

22.1. Formal Training

In India, there are different food technology courses available at diploma, undergraduate, postgraduate and doctorate, levels for the students who are seeking to make a career in the field of food processing . Some of the popular food technology courses in India are B.Tech in Food technology, B.Sc Food Technology, M.Tech in Food Technology, M.Sc Food Technology, etc.

Food Technologists study the content used in manufacturing the product, evaluate methods used in food production facilities and ensure that food safety standards are met as per the guidelines set out by the key regulators across the globe . Other responsibilities include discovering new sources of food, testing for contaminants or harmful additives, and developing new products

Food technology degree holders are selected for various job profiles such as Quality Manager, Regulatory Affairs Officer, Production Managers, etc.

Training Infrastructure

There are around 200 - 250 colleges in India that offer food technology courses at different levels. Out of these colleges, approximately 54% are private while the rest are public/ government/public-private.

Typical topics covered under formal education

Under Graduation		Post-Graduation	
B. Tech in Food Technology	B. Sc Food Technology	M.Tech in Food Technology	M.Sc Food Technology
Food Biochemistry	Fundamentals of food processing	Advanced food chemistry	Food chemistry
Applied mechanics and strengths of materials	Food microbiology	Optimisation techniques in food technology	Food microbiology
Food microbiology	Food hygiene and sanitation	International food legislations and standards	Food technology
Food fermentation technology	Food analysis	Advanced food packaging	Technology of cereals
Food industry waste management	Concentrated and dehydrated milk products	Modern baking and confectionery technology	Packaging technology
Food plant safety and hazard analysis	Bakery and confectionary products	Food plant design	Technology of beverages

Under Graduation		Post-Graduation	
B. Tech in Food Technology	B. Sc Food Technology	M.Tech in Food Technology	M.Sc Food Technology
Food Processing	Principles of fruits and vegetables technology	Rheology and texture analysis	Food additives
Management of Food Processing Industries	Technology of spices and plantation products	Transport phenomenon in food processing	Bioprocess technology
Food & Vegetable Processing	Introduction to business laws and ethics	Handling and storage of food products	Fermentation technology
Bakery & Confectionery Technology	Food chemistry	Waste recycling & resources recovery systems	Principles of food engineering
Crop Processing Technology	Normal therapeutic nutrition	Technology of Fabricated and Textured Foods	Unit operations in food processing
Food Packaging Technology	Fundamentals of milk processing	Enzymes in food processing	Technology of fruits and technology
Refrigeration & Air Conditioning	Food laws and quality assurance	Food toxicology	Technology of meat, fish and poultry
Sugarcane Technology	Fermented milk products	Cold chain management	Pulses and oil seeds technology
Food Plant Engineering	Technology of pulses and oil seeds	Post-harvest technology	Food standards and quality assurance
Beverage Processing	Processed fruits and vegetables products	Separation techniques in food processing	Nutrition and health
Post-harvest physiology of fruits and vegetables	Packaging of fresh and processed foods	Lipid chemistry & technology	Food biotechnology
Food Plant Layout & Design	Technology of Food and seafood	Confectionery technology	
Fat and oil processing technology		Flavour chemistry & technology	
Enzyme Technology		Computer applications in food industry	
Biochemistry of processing and preservation		Advanced engineering statistics	
Fish processing technology		Food quality control	
Meat and poultry processing technology		Meat and marine technology & Others	

Table 195: Typical topics covered under formal education

22.2. In-Formal Training

The food processing industry has a large presence of MSME companies across multiple segments. Many of these companies faces challenges that limit their development and weakens performance. These challenges include:

- Lack of productivity and innovation due to limited skills and access to modern technology and machinery for production and packaging
- Deficient quality and food safety control systems, including lack of basic awareness on good hygienic and manufacturing practices
- Lack of branding & marketing skills and inability to integrate with the supply chains

These companies, need intensive hand holding support for skill training, entrepreneurship, technology, credit and marketing, across the value chain, which necessitates active participation of the government and private companies for better outreach

There are multiple private training companies who are offer Informal training courses to these companies across multiple segments. Most of these companies have a regional or city focus and are trying their level best to train several people who wish to make a career or start a new food processing unit.

National Skill Development Corporation (NSDC), a Government of India enterprise, was developed to promote skill development and funding organisation to build scalable and profitable vocational training initiatives. Food Industry Capacity & Skill Initiative (FICSI) - widely known as Food Processing Sector Skill Council is an autonomous body set up by the NSDC to look at the skill and training requirement of the food processing industry .

FICSI creates Occupational Standards and Qualification Packs, develop competency framework, conducts Train the Trainer Programs, conducts skill gap studies and assess and certify trainees on the curriculum aligned to National Occupational Standards (NOS).

FICSI currently has 49 NSQF aligned QPs which cover 9 sub sectors of Food Processing Industries:

There are around 150+ training institutes partnered with FICSI to train students on the above mentioned QPs for the food processing industry. These institutes are either Pradhan Mantri Kaushal Vikas Yojana (PMKVY) smart training center or non-PMKVY training partners spread across India.

In the last 5 years, ~10,000 students have been trained & certified by ~40 colleges which offer vocational training courses designed by FICSI. Close to 2,650 students have been certified in FY'20.

22.3. Key Expectations on Formal Training Development

Students' Learning

- Various colleges need to introduce courses on creativity and innovation to stimulate problem-solving skills in future
- The student must also be introduced to the industry-initiated courses by entering into MoUs with relevant industries. Industry partners offering courses, both theory and lab

jointly with the faculty members will not only improve the industry academia interaction but will also enhance the employability of the graduates

Mandatory Internship

- Compulsory industry internships will be helpful to the students to get to know the industry work culture and help them to prepare themselves in that direction. The final year project work, which has a provision for the students to undertake projects offered by the industries, can be a great employability booster.
- Not only the content part of the curriculum, but also the effective assessment methodology is equally important to make the overall curriculum effective and meet the objectives. Focus should be on internships to get the students exposed to the job market and help in future employment opportunities.

Curriculum Co-development with the Industry Stakeholders

- Curriculum has to be developed along with the equipment manufacturers, technology providers, food processing units, packaging solutions providers and other key industry stakeholders.
- Frequency of updating the curriculum has to be increased.
- Students should have an option of choosing specialization post the completion of year 1 which will make students develop focused knowledge for their career.

22.4. Key Expectations on In-Formal Training Development

Awareness of Institutes

- Awareness of institutes offering training programs on the QPs developed by FICSI are limited among the food processing industries.

Portal with Students List for Recruitment

- Also, it is expected that FICSI can create a portal with the list of candidates trained from their partner institutes which will help companies to source the skilled manpower when they recruit those candidates

Online Programs & Internships with the Industry

- Introduction on Online education on few QPs where there is a limited practical training are required will help the training programs reach the larger potential candidates.
- Training institutes can partner with the food processing companies in the same region for short internship to get first-hand experience on the plant

22.5. Brief overview of the MSDE Report[58] on Skill Assessment & Anticipation Study (Manufacturing Sector)

Ministry of Skill Development and Entrepreneurship published a report in 2020-21 on Skill Assessment & Anticipation Study in 7 Manufacturing Sectors in India including Food Processing Sector. The key summary of this report w.r.t to the Food Processing Sector is summarised below:

- The Food Industry sector (with the exception of basic processes like rice milling) exhibits the maximum dependence and satisfaction from ITI pass-outs. Both the theoretical and practical knowledge requirements of the segment are well met under the ITI programs. The ITI pass-outs also score well on behavioural and soft skills aspects.
- In Food Processing Sector, the accuracy, precision and dexterity of STT (Short Term Training) certified people is better than unskilled candidates. They are also easier to train/re-train and exhibit better behavioural aspects and adaptability. However, the advantage of STT-certified workers in terms of technical knowledge can be compensated by untrained personnel in 7-10 days.
- The key Job roles identified in Food Processing Sector is as given below:
    - Electrician; Mechanic; Machine Operator; Plumber; Fitter; Boiler Mechanic; Boiler Operator; Refrigeration Operator; Welder; Janitor; Production Operator; Mech. Technician; Chef; Oven Operator; Mixing Operator; Sweeper; Packager; Factory Helper; Baker; Sortex Foreman; Furnace Operator; Quality Analyst; Material Handler; Packaging & Products handling team
- Key Occupations where supply is a constraint in Food Processing Sector:
    - Food Technologist
    - Geographical skew (supply of skilled labour in rural areas).
    - Quality & Safety norms
- As firms in the Food processing sector expand into export markets, they shall enhance skill intensity in the production and post-production activities including product handling, quality checking and packaging which is critical for maintaining quality and regulatory compliance.

[58] MSDE Report on Skill Assessment & Anticipation Study

Chapter 23: Recommendations on the Rationalization of the Current QPs

23.1. Current QP details

Food Processing Sector Skill Council is an autonomous body set up by the NSDC to look at the skill and training requirement of the food processing industry. FICSI creates Occupational Standards and Qualification Packs, develop competency framework, conducts Train the Trainer Programs, conducts skill gap studies and assess and certify trainees on the curriculum aligned to National Occupational Standards (NOS).

FICSI currently has 49 NSQF aligned QPs which cover 9 sub sectors of Food Processing Industries. Most of these QPs can be merged based on similarity in competencies and other relevant factors. The current details on the number of QPs by sub-sectors is listed below.

Segment	Total Number of QPs
Fruits and Vegetables	22
Dairy Products	7
Food Grain Milling	6
Bread and Bakery	6
Meat and Poultry	3
Packaged Foods	3
Fish and Sea Food	1
Soya Food	1
Total	**49**

Table 196: Details on the QPs which can be merged / rationalised

Source : FICSI

23.2. Approach and Methodology for QP Rationalisation

Feedback conducted a detailed assessment of the current QPs, and recommended some of the QPs that can be rationalised, following is the detailed approach and methodology that was followed to arrive at the final list

- Detailed assessment of the current QPs under consideration and comparison of the QPs that cover the similar subject (e.g., processing of dairy products) and have the same National Skill Qualification Framework (NSQF) levels.
- Study the job descriptions given in the QPs and also detailed discussions with relevant Subject Matter Experts (SMEs) to understand the activities unique to each job role.

- Assessment of all the NOSs given in every QP. The study of NOSs included the study of Performance Criteria (PC) in each element, Knowledge and Understanding (KU) and Generic Skills (GS).

23.3. Final list of QPs that can be Rationalised

We established similarity in competencies, knowledge and generic skill requirements between nine QPs belonging to the same sub-sectors. It was also observed that all the QPs have three common types of NOS that cover the following areas:

- Preparation and maintenance of the work area and process machineries
- Documentation and record-keeping, and
- Food safety, hygiene and sanitation for processing food products

The differentiating factor among these QPs is often just one or two core NOSs that cover the core competencies specific to the job role. We recommend that the following QPs be merged on the basis of similarities the job roles share:

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
1	Plant Biscuit Production Specialist	FIC/Q5003	4	Bread and Bakery	1. FIC/N5009: Prepare and maintain work area and process machineries for producing biscuits in industrial units 2. FIC/N5010: Prepare for production of biscuits in industrial units 3. FIC/N5011: Produce biscuits in industrial units 4. FIC/N5012: Complete documentation and record keeping related to production of biscuits in industrial units 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	A Plant Biscuit Production Specialist produces biscuits in industrial units as per defined SOPs in synchronisation with rest of the plant/unit by weighing, mixing, kneading, rolling/sheeting, cutting, moulding, baking, cooling, etc. either manually or using machineries following the defined SOPs of the plant/unit.	A Plant Biscuit Production Specialist must have the ability to plan, organize, prioritize, calculate and handle pressure. S/he must possess reading, writing and communication skills. In addition, the individual must have stamina to be able to stand for long hours, have personal and professional hygiene and an understanding of food safety standards and requirements	These QPs are from the same sub-sector i.e., Bread and Bakery and have the same NSQF level of 4. We have studied the Performance Criteria (PCs), Knowledge and Understanding (KU) and Generic Skills (GS) given in these QPs. Basis the study, we have established that most of the core competencies in these job roles are similar and interconnected, such as mixing, kneading,

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
2	Mixing Technician	FIC/Q5004	4	Bread and Bakery	1. FIC/N5013: Prepare and maintain work area and machineries for making dough used in baked products 2. FIC/N5014: Prepare for making dough used in baked products 3. FIC/N5015: Make dough used in baked products. 4. FIC/N5016: Complete documentation and record keeping related to making dough used in baked products 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	A Mixing Technician prepares different types of dough used in making baked products by using various methods such as weighing, mixing, kneading, fermenting following the defined SOPs of the plant/unit while maintaining food safety and hygiene in the work environment.	A Mixing Technician must have the ability to plan, organize, prioritize, calculate and handle pressure. S/he must possess reading, writing and communication skills. In addition, the individual must have stamina to be able to stand for long hours, have personal and professional hygiene and an understanding of food safety standards and requirements	moulding, baking, etc. Therefore, instead of keeping three separate QPs, we can merge these into one QP covering these competencies. The new QP will be titled industrial Baker that will be applicable to Industrial bakery units.
3	Baking Technician/ Operative	FIC/Q5005	4	Bread and Bakery	1. FIC/N5017: Prepare and maintain work area and machineries for baking products in the oven 2. FIC/N5018: Prepare for baking products in the oven 3. FIC/N5019: Bake bakery products in the oven 4. FIC/N5020: Complete documentation and record keeping related to baking products in the oven 5. FIC/N9001: Ensure food	A Baking Technician/Operative is responsible for baking of products, maintaining their consistency and quality, while meeting defined SOPs and leveraging his/her skills to operate ovens in synchronisation with proof box/ rest of the plant/ unit	A Baking Technician/Operative must have the ability to plan, organize, prioritize, calculate and handle pressure. S/he must possess reading, writing and communication skills. In addition, the individual must have stamina to be able to stand for long hours, have personal and professional hygiene and an understanding	

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
					safety, hygiene and sanitation for processing food products		of food safety standards and requirements.	
4	Dairy Processing Equipment Operator	FIC/Q2002	4	Dairy Products	1. FIC/N2005: Prepare and maintain work area and process machineries for operating dairy processing equipment 2. FIC/N2006: Prepare for operating dairy process machineries and production of various dairy products 3. FIC/N2007: Operate dairy processing machineries 4. FIC/N2008: Complete documentation and record keeping related to operating of dairy processing equipment 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	A Dairy Processing Equipment Operator is responsible for operating various types of dairy processing machineries for producing dairy products such as filter, separator, homogenizer, pasteurizer, chiller, churner, clarifier, freezer etc. to filter, separate, homogenize, pasteurize, cool, churn, clarify, freeze milk	A Dairy Processing Equipment Operator must have the ability to plan, organize, prioritize, calculate, concentrate and handle pressure. The individual must possess reading, writing and communication skills. In addition, the individual must have mechanical aptitude and trouble shooting skills.	Considering 'Milk Powder Manufacturing Technician' and 'Dairy Processing Equipment Operator' QPs share three common NOS, and both the job role holders are required to operate various equipment in a dairy plant, we can create a NOS detailing the competencies unique to the job role of a Milk Powder Manufacturing Technician and include that in the Dairy Processing Equipment Operator QP as an optional NOS while the other NOSs will be compulsory NOS. The QPs belong to the same sub-sector and have NSQF level 4.
5	Milk Powder Manufacturing Technician	FIC/Q2006	4	Dairy Products	1. FIC/N2020: Prepare and maintain work area and process machineries for production of milk powder 2. FIC/N2021: Production of milk powder 3. FIC/N2022: Complete documentation and record keeping related to production of	A Milk Powder Manufacturing Technician is responsible for production of milk powder through the process of filtration, standardization, pasteurization, homogenization, evaporation and drying by operating various	A Milk Powder Manufacturing Technician must have the ability to plan, organize, prioritize, calculate, concentrate and handle pressure. The individual must possess reading, writing and communication skills. In	

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
					milk powder 4. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	machineries following specifications and standards of the organisation. This role is similar to production of milk powder in semi-automated and fully automated units	addition, the individual must have mechanical aptitude and trouble shooting skills.	
6	Squash and Juice Processing Technician	FIC/Q0101	4	Fruits and Vegetables	1. FIC/N0101: Prepare and maintain work area and process machineries for squash and juice processing 2. FIC/N0102: Prepare for production of squash and juice 3. FIC/N0103: Produce Squash and Juice 4. FIC/N0104: Complete documentation and record keeping related to production of squash and juice 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	A Squash and Juice Processing Technician is responsible for preparation of squash and juice from fruits through the process of receiving, checking raw material quality, sorting, pulping, extracting juice, pasteurizing, filtering, sampling for quality analysis, filing, packaging and storing.	A Squash and Juice Processing Technician must have the ability to plan, organize, prioritize, calculate and handle pressure. The individual must possess reading, writing and communication skills. In addition, the individual must have stamina and professional hygiene.	These QPs are from the same sub-sector i.e., Fruits and Vegetables and have the same NSQF level of 4. Based on the study of PCs, KU and GS in the three QPs, we have established that most of the core competencies are similar these job roles and interconnected, such as sorting, pulping, pasteurizing, packaging, etc. Therefore, instead of keeping three separate QPs (i.e., Squash and Juice Processing Technician; Jam, Jelly and Ketchup Processing Technician; and Fruit Pulp Processing
7	Jam, Jelly and Ketchup Processing Technician	FIC/Q0103	4	Fruits and Vegetables	1. FIC/N0109: Prepare and maintain work area and process machineries for jam, jelly and ketchup processing 2. FIC/N0110: Prepare for production of jam, jelly and ketchup 3. FIC/N0111:	A Jam, Jelly and Ketchup Processing Technician is responsible for processing fruits and vegetables to make jam, jelly and ketchup by receiving, checking raw material quality, sorting,	A Jam, Jelly and Ketchup Processing Technician must have the ability to plan, organize, prioritize, calculate and handle pressure. The individual must possess reading,	

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
					Produce jam, jelly and ketchup 4. FIC/N0112: Complete documentation and record keeping related to production of jam, jelly and ketchup 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	pulping, pasteurizing, cooking, juice extracting, clarifying, filtering, sampling for quality analysis, cooling, packaging and storing.	writing and communication skills. In addition, the individual must have stamina and professional hygiene.	Technician), we can merge these into one QP covering the competencies in separate NOSs, as appropriate.
8	Fruit Pulp Processing Technician	FIC/Q0106	4	Fruits and Vegetables	1. FIC/N0120: Prepare and maintain work area and process machineries for production of fruit pulp 2. FIC/N0121: Prepare for production of fruit pulp 3. FIC/N0122: Produce fruit pulp from various fruits 4. FIC/N0123: Complete documentation and record keeping related to production of fruit pulp 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	A Fruit Pulp Processing Technician is responsible for pulping/producing fruit pulp through the process of receiving, ripening, checking raw material quality, sorting, washing, cutting/slicing, deseeding/destoning, pulping, pre-cooking, sterilizing, aseptic packaging or canning, sampling for quality analysis and storing	A Fruit Pulp Processing Technician must have the ability to plan, organize, prioritize, calculate and handle pressure. The individual must possess reading, writing and communication skills. In addition, the individual must have stamina and professional hygiene.	
9	Chief Miller	FIC/Q1001	6	Food Grain Milling	1. FIC/N1001: Prepare and maintain work area and process machineries for grain milling 2. FIC/N1002: Prepare for the milling process and manage it 3. FIC/N1003:	A Chief Miller manages the milling process for all types of grains overseeing activities such as handling of various milling machineries, maintenance of	A Chief Miller must have the ability to plan, organize, prioritize, calculate, concentrate and handle pressure. The individual must possess	These 2 QPs cover similar competencies in supervisory roles. The competencies include overseeing the operations of a grain mill such as smooth

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
					Complete documentation and record keeping related to grain milling 4. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products 5. FIC/N9004: Manage and lead a team	process parameters, inspection of raw material and finished goods to achieve the desired quality and quantity of products.	reading, writing and communication skills. In addition, the individual must have mechanical aptitude and trouble shooting skills.	functioning of machineries at the mill and achieving the set quality standards while ensuring adherence to the applicable health and safety standards. Therefore, the 2 QPs can be merged into one that will be titled Chief Miller with NSQF level 5.
10	Milling Technician	FIC/Q1002	5	Food Grain Milling	1. FIC/N1004: Prepare and maintain work area and process machineries for execution of the grain milling process 2. FIC/N1005: Grain milling 3. FIC/N1006: Complete documentation and record keeping related to execution of the grain milling process 4. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products 5. FIC/N9004: Manage and lead a team	A Milling Technician is responsible for the milling of all types of grains such as rice, wheat, pulses, etc. to achieve the desired quality and quantity of products while maintaining food safety and hygiene in the work environment	A Milling Technician must have the ability to plan, organize, prioritize, calculate, concentrate and handle pressure. The individual must possess reading, writing and communication skills. In addition, the individual must have mechanical aptitude and trouble shooting skills.	
11	Grain Mill Operator	FIC/Q1003	4	Food Grain Milling	1. FIC/N1007: Prepare and maintain work area and process machineries for operating a grain mill 2. FIC/N1008: Prepare for production of products from various grains 3. FIC/N1009: Operate grain	A Grain Mill Operator carries out processes such as cleaning, de-stoning, de-husking, hulling, polishing and grinding to produce milled grains and flour(s).	A Grain Mill Operator must have the ability to plan, organize, prioritize, calculate, concentrate and handle pressure. The individual must possess reading, writing and	Merging these 2 QPs, name will be Grain mill operator Level 4 A study of Grain Mill Operator and Pulse Processing Technician QPs

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
					mill 4. FIC/N1010: Complete documentation and record keeping related to operating a grain mill 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products		communication skills. In addition, the individual must have mechanical aptitude and trouble shooting skills.	has established that these QPs cover the same competencies such as cleaning, de-stoning, dehiscing, polishing grinding etc. Therefore, these QPs can be merged into one, with separate NOSs covering grain milling and pulse processing.
12	Pulse Processing Technician	FIC/Q1004	4	Food Grain Milling	1. FIC/N1011: Prepare and maintain work area and process machineries for milling pulses 2. FIC/N1012: Prepare for production of pulses 3. FIC/N1013: Carry out milling of pulses 4. FIC/N1014: Complete documentation and record keeping related to milling pulses 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	A Pulse Processing Technician is responsible for milling various types of pulses (red gram, black gram, bengal gram, green gram, green peas, etc.) through processes such as cleaning, de-stoning, conditioning, dehusking, splitting, sorting, polishing and grinding.	A Pulse Processing Technician is responsible for milling various types of pulses (red gram, black gram, bengal gram, green gram, green peas, etc.) through processes such as cleaning, de-stoning, conditioning, dehusking, splitting, sorting, polishing and grinding.	
13	Meat and Poultry Processor	FIC/Q3004	4	Meat and Poultry	1. FIC/N3008: Prepare and maintain work area and process machineries for meat & poultry processing 2. FIC/N3009: Prepare raw material for meat & poultry processing 3. FIC/N3011: Complete documentation and record	The individual is responsible for eviscerating, splitting, cutting, trimming and preparing meat and poultry using knives, cleavers, meat saws, etc. to the specifications intended for commercial, industrial,	A meat and poultry processor must be able to read and write. S/he must possess hand eye co-ordination, dexterity, knife techniques, physical strength and stamina. In addition, s/he must also be able to lift	These two QPs share three common NOS and both the job holders are involved in extracting and processing of meat using the relevant tools and equipment. Therefore, the QPs can be

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
					keeping related to meat & poultry processing 4. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products 1. FIC/N3010: Carry out butchery of meat 2. FIC/N3017: Carry out poultry dressing	wholesale or retail sale. S/he is expected to maintain food safety and hygiene in the work environment	heavy weights, stand for long hours, possess good health and personal hygiene and have an understanding of food safety standards	merged into one. The common NOSs can be kept as compulsory NOS while meat processing, butchery, poultry dressing, offal collection and utilisation as electives. Offal collection and utilisation can be covered in a single NO.
14	Offal Collector and Utilizer	FIC/Q3005	4	Meat and Poultry	1. FIC/N3012: Prepare and maintain work area and process machineries for offal collection and utilization 2. FIC/N3013: Prepare for offal collection and utilization 3. FIC/N3014: Carry out offal collection and utilization 4. FIC/N3015: Complete documentation and record keeping related to offal collection and utilization 5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products	An Offal Collector and Utilizer is responsible for collecting offal from meat and poultry and separating it into edible and inedible offal by the process of cutting, trimming, bleaching, skinning, flushing, etc. S/he is also responsible for utilizing inedible offal to convert it into edible and inedible value-added products.	An Offal Collector and Utilizer must be able to read and write. S/he must possess communication skills, hand eye co-ordination, dexterity, knife techniques, physical strength and stamina. In addition, he must also be able to lift heavy weights, stand for long hours, possess good health and personal hygiene and have an understanding of food safety standards	
15	Modified Atmosphere Storage Technician	FIC/Q7003	4	Fruits and Vegetables, Dairy Products, Meat and Poultry,	1. FIC/N7007: Prepare and maintain work area and storage equipment for modified atmosphere storage	A Modified Atmosphere Storage Technician is responsible for storage of various kinds of produce in a	A Modified Atmosphere Storage Technician must have the ability to plan, organize, prioritize,	These two QPs also share common NOSs covering the same competencies i.e., storage of various dairy

S.No.	QP Name	QP Code	NSQF Level	Sub Sector	NOS Name	Brief Job Description	Personal Attributes	Feedback Remarks
				Fish and Sea Food	2. FIC/N7008: Store agricultural produce in modified atmosphere storage 3. FIC/N7009: Complete documentation and record keeping related to modified atmosphere storage 4. FIC/N9003: Food safety, hygiene and sanitation for storage	modified atmosphere in the storage unit. S/he carries out processes such as receiving the produce, assessing its quality, pre-cooling, creating ambient temperature, pressure and relative humidity in the modified atmosphere storage unit.	calculate and handle pressure. The individual must possess reading, writing and communication skills. In addition, the individual must have stamina and professional hygiene	and meat products, agricultural and horticultural produce in a controlled environment. Basis this, we can merge the two QPs. Both the QPs are from the same sub-sector and have the same NSQF level.
16	Cold Storage Technician	FIC/Q7004	4	Fruits and Vegetables,	1. FIC/N7010: Prepare and maintain work area and refrigeration equipment 2. FIC/N7011: Handle cold storage facility for storing food 3. FIC/N7012: Complete documentation and record keeping related to the cold storage facility 4. FIC/N9003: Food safety, hygiene and sanitation for storage	Cold Storage Technician is responsible for handling installation of refrigeration system and components, refrigerant charging and storage of food in the cold storage room by maintaining storage parameters such as temperature and relative humidity in food processing units.	A Cold Storage Technician must have the ability to plan, organize, prioritize, calculate and handle pressure. The individual must have a mechanical aptitude and must possess reading, writing and communication skills. In addition, the individual must have stamina and professional hygiene.	The competencies specific to a Cold Storage Technician can be covered in a separate NOS that can be kept as an optional NOS. The job holder will also carry out minor repair and maintenance in the storage/ cold storage.

Table 197: Final list of QPs that can be rationalised

Total number of active QPS post the recommend rationalisation by segment is given below -:

Sector	Current Number of QPs	Number of QPs post rationalisation
Bread and Bakery	6	3
Dairy Products	7	5
Fish and Sea Food	1	1
Food Grain Milling	6	4
Fruits and Vegetables	22	19
Meat and Poultry	3	2
Packaged Foods	3	3
Soya Food	1	1
Total	**49**	**38**

Table 198: Total number of active QPS post the recommend rationalisation by segment

Source: Feedback Analysis

Key Observations with respect to the QP content

Apart from the merging of QPs, it has been observed that existing NOSs need to be revised based on the latest guidelines of the National Skill Development Corporation (NSDC). Following are the observations in this regard:

- Many PCs are written in the format of learning outcomes. Learning outcomes are suited for inclusion in Model Curriculums (MCs) while the competencies are supposed to be activities that a job holder is supposed to carry out practically.
- There is a large scope of streamlining PCs wherein relevant PCs may be clubbed while unnecessary PCs may be deleted.
- We need to also identify gaps in competencies and include the missing competencies. Competencies unique to each job role need to be identified and included in the respective QPs. In the present form, NOSs and PCs are very similar in all these QPs. This is a common observation with respect to all the QPs in question.
- In many of the level 5 and above QPs, NOS titles need to be updated to reflect the nature of the supervisory or managerial job role. Most of the present NOS titles in these QPs seem to suggest that the supervisor or manager is carrying out level 4 or 3 activities instead of overseeing or managing them.
- Knowledge and Understanding (KU) section in the QPs have many knowledge requirements that are no longer accepted by NSDC Standards Team, such as 'own job role and responsibilities' and 'organisational policies'. KU must include components relevant to the competencies listed in the respective NOS.
- Generic Skills (GS) largely include core competencies or knowledge requirement that must be included in the relevant sections i.e., PCs or KU. Generic skills need to be written as per the latest guidelines from NSDC.

Chapter 24: Recommendations to MOFPI

24.1. A 10-year action plan outlining the approach to mitigate the skill gap and development of relevant skillsets for the future including effective ways of undertaking skilling activities with public and private sector involvement

Informal / Vocational Training

Unlike large firms, MSME firms do not have any major training infrastructure or capabilities to train their employees and face the load of higher attrition levels. They need MOFPI support immediately.

In the informal / vocational training, MOFPI has a very crucial role to play in developing the skilling requirements of the industry for the current and in the likely future. The key action points required to be implemented over the next 10 years is outlined below:

1. **MOFPI needs to support creation of 'MOFPI Authorised Center from Training (MACT) in FP HUBS**

MACT are essentially an **employability enhancement initiative** taken by MOFPI. These should be made mandatory for all employees getting into the FP Sector in the near future. The skill syllabus to be considered by MACT is to train and make candidates JOB READY with a 3 Month training. This would **largely be beneficial for MSME firms** as they do not have the requisite capacity / capability to train employees.

MOFPI needs to devise this program on the lines of the **Production Linked Incentive Program (PLI**) Scheme and **invite participation from firms to set up & operate** these MACT Centers with a subsidy element based on per student placed (for new students) OR the number of Workers trained (for existing employees).

MOFPI could also strive to bring this MACT Program under the **"National Apprenticeship Program" Scheme (NAPS)** implemented by Directorate General of Training (DGT) and National Skill Development Corporation (NSDC).

a. MOFPI/FICSI to come out with a **3 Month Certified Training program** which consists of:

   i. **Common Syllabus and a most urgent requirement** for all Sub Sectors is the Food Safety & Hygienic Work practices. These centers could work with FSSAI in this area. This needs to be immediately taken up.

   ii. The Certification Program also includes **Sub-sector wise specific Syllabus** such as Manufacturing process overview, key equipment used, operations of these key equipment and Cleaning and handling of raw materials etc.

iii. An online Library could be created across all subsectors.

iv. This should include a 10-week classroom training along with a 2-week onsite training in any Local FP unit (apprentice model)

v. Development of **skill syllabus to be undertaken FICSI by taking inputs from the industry experts, food technologist, and senior members** from the industry, food nutrition and science colleges in the specific FP Hubs for MACT

vi. Curriculum and skill syllabus needs to in local language for the relevant sub sector of interest in these regions.

vii. FICSI to undertake the development of a special Training Program for "Trainers" who could be deployed in these MACTs.

viii. Empanelment of industry persons (superannuated) as certified trainers.

ix. Post competition of the Training Program, the individual could be called as "**MOFPI Certified FP Skilled Worker**"

x. This course can also be targeted to the **existing workers,** as a **refresher course** to be updated on the latest trends in FP industry

xi. Once MACTs are established, the existing employees in the FP Units could also be sent here to get a Certified Training from these schools.

b. MOFPI needs to aim to invest and set up these MACTs in most FP Cluster Hubs / Districts in the country. Our research has estimated 120+ FP Clusters / Districts in India as shown below:

c. The ideal implementation plan should be as given below:

	Immediate	2nd & 3rd Year	4th to 6th year	6th to 10 years
Training infrastructure to be set up	Top 25 districts in the Country	Top 120 districts in the Country	Top 200 districts in the Country	New upcoming Clusters / districts

Table 199: MACT : Implementation Plan

Some suggestions for implementation:

i. Local Hiring from areas surrounding FP Hub should be encouraged rather than migrant labor from far off states for these FP Finishing Schools.

ii. Need to come up with **an incentive-based approach to encourage more women to join the FP industry** in these clusters (Stipend / Job guarantee / Free training / Safety kit etc.)

d. MOFPI could consider using the FOSTAC courses undertaken by FSSAI included in this MACT program and the IIFPT-Incubation centre be used as a training centre for skill development under this program

2. Skill-gap focus for Large, & MSME firms

Based on discussions with the processing plants and SMEs, Feedback has identified 78 Job roles from these 11 sub sectors and 14 additional emerging job roles (**overall 92 job roles**) that will create significant employment between FY'20 and FY'30. MOFPI and FICSI needs to create relevant vocational training programmes for these identified job roles. These job roles are spread between NSQF level 3 & NSQF level 6. Below table enumerates the job roles identified in each sub-sector.

Sub-Sector	NSQF Level 3	NSQF Level 4	NSQF Level 5	NSQF Level 6
Bread & Bakery Products		1. Oven Operator or Baking Equipment Operator 2. Bread Slice Machine Operator 3. Ingredients Process Mixers Operators 4. Flow Wrapping / Flow-Pack Machine Operator	1. Bakery Processing Plant Supervisor	1. R&D Manager
Dairy Products	1. Machine & Truck Cleaners	1. Bulk Milk Cooler Operator 2. Milk Pasteurization Plant Operator 3. Paneer Press Machine Operator 4. Form Fill Seal Machine Operator 5. Container Filling Machine Operator 6. Ice Cream Manufacturer	1. Dairy Processing Plant Supervisor 2. Data Analyst	1. R&D Manager 2. Inventory Manager
Fish & Seafood Processing	1. Shell remover and Cleaner	1. Defrosting & Washing Machine Operators 2. Filleting & Cutting Machine Operator 3. Squid Pressing Machine Operator	1. Fish & Seafood Processing Plant Supervisor	1. Warehouse Manager
F&V Processing	1. Grader, Sorter & Cleaner	1. Freeze Drying & Dehydrating Equipment Operator 2. Bottling / Pouch Plant Operator 3. Jam and Jelly Producer	1. F&V Processing Plant Supervisor	1. Fruit Technologist
Meat & Poultry Processing	1. Animal Attendant 2. Meat & Poultry Pre-Processor 3. Deboning & Slaughter Butcher	1. Slaughtering Line Operator 2. Meat Mincer Operator 3. Thermoforming, Traysealing, Horizontal Flow Pack, Vertical Flow Pack and Stretch Film Machine Operator	1. Meat & Poultry Processing Unit Supervisor	1. Veterinarian 2. Storage Manager
Milling	1. Grain & Oilseed Cleaner & Pre-processor	1. Milling machine operator 2. Flour Packaging Machine Operator 3. Oil Pouch Packing Machine Operator 4. Rice Mill Operator 5. Wheat Flour Mill Operator	1. Mill Supervisor	
Beverages (Tea & Coffee)	1. Tea Taster	1. Coffee Huller Operator 2. Dryer / Roaster Plant Operator 3. Dosing, Filling, Weighing and	1. Tea & Coffee Processing Plant Supervisor	

Sub-Sector	NSQF Level 3	NSQF Level 4	NSQF Level 5	NSQF Level 6
		Sealing Machine Operator 4. System Administrator 5. Spray Dryer Operator 6. Freeze Dryer Operator		
RTE & RTC Products	1. Ingredient Preparator	1. Freeze Drying Machine Operator 2. Pick-Fill-Seal Machine Operator 3. Food Extruder Machine Operator	1. RTE/RTC Plant Supervisor	
Soya Processing	1. Soya Seed Cleaner & Pre-Processor	1. Soya Milling Machine Operator 2. Soya Nugget Machine Operator 3. Flour Packaging Machine Operator 4. Oil Pouch Packing Machine Operator	1. Soya Processing Plant Supervisor	
Spices	1. Grader & Sorter	1. Grinding & Blending Machine Operator 2. Pouch Packaging Machine Operator 3. Steam Sterilisation Machine Operator 4. Cryogenic Grinding Machine Operator	1. Spice Plant Supervisor	
Cold Chain		1. Refrigeration Plant Operator 2. Cold Storage & Refrigeration Plant Mechanic 3. Material Handling Equipment Operator 4. Reefer Truck Driver	1. Cold Storage Supervisor	
Common Job Roles	1. Helper / Floor Cleaner / Loader & Unloader		1. Food Laboratory Assistant	1. Food Safety & Hygiene Manager

Table 200: MACT : *Job roles which will create significant Employment across sectors between FY'20 & FY'30*

Apart from the above job roles Feedback has also identified 14 New job roles which are likely to emerge in the Food processing sector in the areas of **Industry 4.0, New product development specialist, Food Fortification, Packaging – Smart packaging & Food labs – Testing.** The details for the same are listed below -:

Emerging Area	Job Role	NSQF Level	Brief Description
Industry 4.0	Data Analyst - Food Industry	5	A Data Analyst - Food Industry is responsible for collecting, modelling and structuring a variety of data in the food industry to extract useful information, trends, patterns and other necessary metrics that can be converted into insights, to be used for making better business decisions and market strategies. The individual uses a variety of data management tools along with relevant Industry 4.0 and Internet of Things (IoT) technologies for effective data handling and analysis.
	Food Analytics and	6	A Food Analytics and Insights Manager is responsible for building and managing business performance dashboards and reporting on various business issues to relevant stakeholders

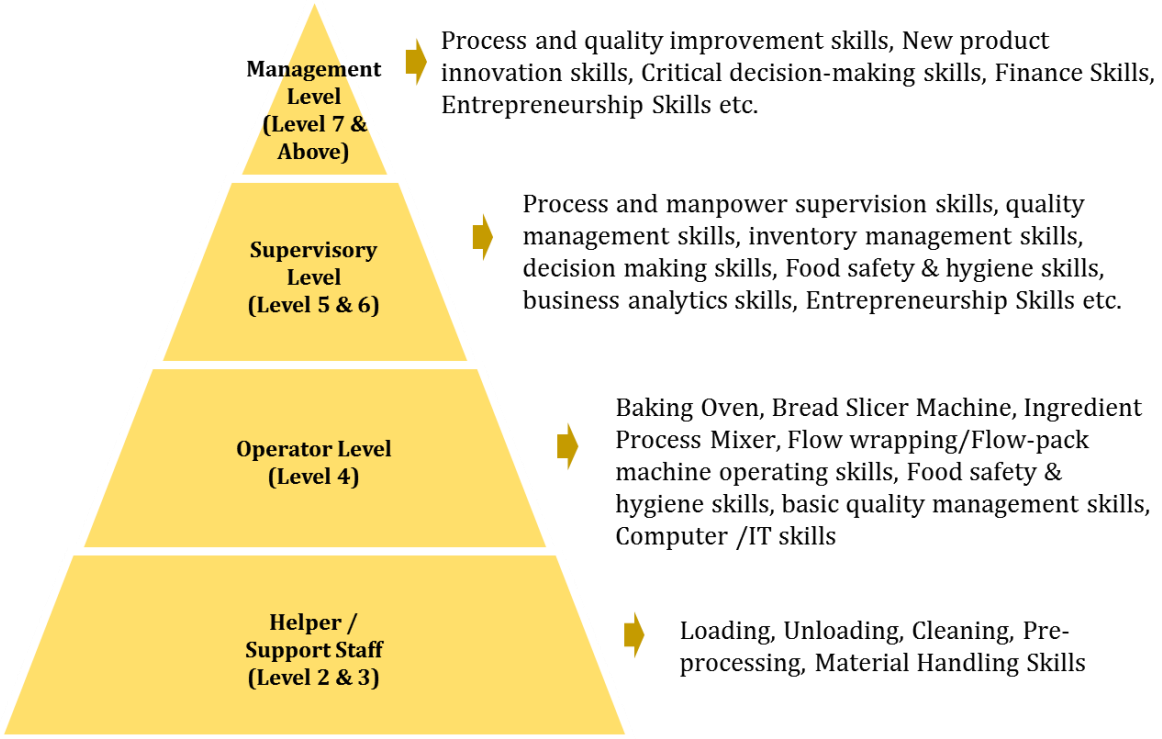
Emerging Area	Job Role	NSQF Level	Brief Description
	Insights Manager		providing appropriate analysis and conclusions. The individual uses a variety of data science tools for performing these duties and manages a team of data analysts.
	Supply Chain Manager - Traceability and Product Recall	6	A Supply Chain Manager is responsible for planning, implementing, and monitoring organisation's overall supply chain strategy including development and execution of strategies to maximise efficiency and productivity.
	Factory Automation Engineer	5	A Factory Automation Engineer is responsible for executing a range of engineering solutions from single loop control to the installation and programming of distributed control system, such as system integration, turnkey project execution, process engineering, etc.
New product development specialist	Food Product Development Manager	6	A Food Product Development Manager is responsible for developing variety of food products such as nutraceutical products, extruded products, foods for special dietary requirement, nutritional supplements, bakery products, cereals, beverages, etc. The individual manages the complete process of product development, from laboratory experiments to commercial production.
	Molecular Gastronomist	4	A Molecular Gastronomist is responsible for carrying out a specific type of cooking in which special tools and techniques are used to produce food non-conventional ways, involving the use of equipment such as vacuum chambers and unusual ingredients that cause food to react in unusual ways.
	Food R&D Specialist	5	A Food R&D Specialist works on research and development of food items to develop new and improve existing food products. This includes processes such as sensory evaluation, recipe optimisation, and other applicable food development and processing technologies.
Food Fortification	Food Fortification Research Associate	4	A Food Fortification Research Associate is responsible for conducting research to evaluate the efficacy of consumption of food items fortified with certain micronutrient such as vitamins and minerals in selected age groups of the target audience. The individual conduct research in coordination with food scientists.
	Program Policy Officer - Food Fortification	7	A Programme Policy Officer - Food Fortification is responsible for large scale food nutrition and fortification program implementation. The individual is responsible for leading the assigned project at different stages of its life cycle including planning, execution, monitoring and evaluation. The person manages a team of coordinators and ensures smooth delivery of food fortification projects.
Packaging – Smart packaging	Packaging Engineer	5	A Packaging Engineer develops effective designs packaging that is functional, cost-effective, and fits the project's brief. The individual generates ideas and concepts, testing different designs, working with the relevant teams during the manufacturing process, and reviewing the efficiency of the final packaging. The person uses innovative and smart designing technologies for the purpose, such as embedded

Emerging Area	Job Role	NSQF Level	Brief Description
			sensor technology to extend product's shelf life, monitor its freshness, display information on quality, and improve product and consumer safety.
	Packaging Technologist	4	A Packaging Technologist assists in the process of designing, developing and manufacturing packaging for a range of food products. The individual works in coordination with the Packaging Engineer and helps in developing new packaging products as per the prepared briefs, ensuring compliance with the applicable quality standards.
Food labs – Testing	Food Lab Analyst	4	A Food Lab Analyst is responsible for conducting various standardised tests to determine the chemical, physical, or microbiological features of a variety of food products to determine their suitability for human consumption.
	Food Scientist	5	A Food Scientist is responsible for conducting research to develop and test different ingredients and food items, ensuing they are safe for humans' consumption. In the process, the individual applies knowledge of life and physical sciences to create new technologies and methods of food production, processing, and packaging. The person is also responsible for ensuring the finished product meets the standards of quality and safety as per the applicable food laws and regulations.
	Food Technologist	5	A Food Technologist is responsible for planning the production of food and drink products and may work in a wide range of settings, including hotels, factories, laboratories, etc. The individual is responsible for the safe and efficient development, modification and manufacture of food products and processes.

Table 201: *New Job roles created by Impact of other key factors*

The typical skills required at each level in each of these sub sectors in given in each of the sub sectors report in the annexure. An example of the same for one sector is shown below here for easy understanding:

Bread & Bakery Sector



Note: Skill sets for all the levels except level 4 will remain almost the same. Skill sets for level 4 will change based on the industry

Figure 206: Bread & Bakery Sector: Skill Sets required across multiple levels in the sector

The typical career progression for each of these levels is show below:

Career Progress Chart

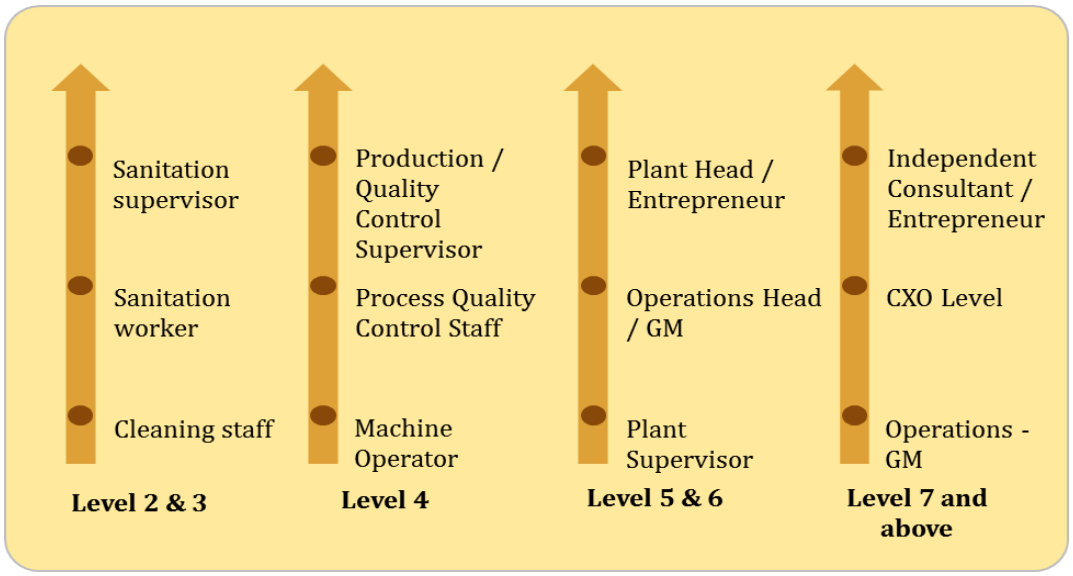


Figure 207: Career Progress Chart

3. Skill-gap focus for Micro enterprises, Startups and Entrepreneurship firms

Specifically for the Micro enterprises, the Government of India has come up with a major scheme to uplift and formalize the Micro enterprises in Food Processing, this is called as **PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)**. This is being set up for providing financial, technical and business support for upgradation of existing micro food processing enterprises and targeted at nearly 200,000 enterprises

Under this scheme, there is a specific provision for helping the identified Micro enterprises with the required skills and training. This is part of the 'Capacity Building & Research' objectives of the Scheme.

From the 78 Job Roles identified earlier, not all the job roles will be applicable for Micro enterprises as they are very small in size and may not have so many roles. But **specific job roles only in each sub sector given above could be used to train these micro enterprises**. There could be certain new Job roles / Skill gaps existing in these Micro enterprises which needs to be evaluated in detail for each of the Products identified under this Scheme.

If MOFPI / FICSI is able to provide the QP's for the above Job roles, the same could be used to address the training requirement of Micro Enterprises as well (specific roles only).

Apart from the above Job roles, most Micro Enterprises, being proprietary run, would also need some specific skills training such as:

- Entrepreneurship development, essential functions of enterprise operations, marketing, bookkeeping, registration, FSSAI standards, Udyog Aadhar, GST Registration, general hygiene, etc.
- Specific training designed for ODOP product, or the product produced by the unit including operations of necessary machines, hygiene issues, packaging, storage, procurement, new products development etc. (***this could be taken from the Skills Syllabus of the MACTs as described above***)

4. Development of Qualification Packs

a. FICSI currently has 49 nos. of QP's which are now rationalized to 38 nos.

b. In this report, we have identified 92 number of job roles for which there needs to be a QP development program.

c. FICSI needs to identify new Job roles and develop QP's for each Sub Sector once in 2-3 years to meet the emerging requirements.

5. Industry Labour Portal

a. Trained workers Portal (e.g., FPNaukri.com) to be introduced at the earliest and all trained workers database needs to be maintained at a District / cluster level – Need to work towards making this as a 'One-stop-shop' for FP Labour / employees' recruitment for the industry

b. Industry members could visit the portal and search the required profiles and connect with them to recruit their employees.

c. AI based algorithms need to be developed for easier matchmaking and facilitating selection and employment confirmation

6. <u>FP Sector Manpower requirement planning</u>

a. This report presents the likely Job creation opportunities over the next 10 years and sets out this requirement at a State level and Sector level. It is estimated that currently there are 14,61,590 employees in the FP Sector which is likely to increase to 28,02,848 employees by 2030.

b. We would recommend that a revisit of this sector needs to be undertaken every 5 years to adjust the manpower planning for such a huge Sector with visible dynamic changes all round.

7. <u>Need to work with the Industry in PPP mode</u>

a. Specifically with the Food Processing Equipment Companies, MOFPI / FICSI needs to have a tie up and have a pool of resources / QP's and training programs to address the Maintenance Training requirements in each Sector.

   i. With most medium & small food processing companies having an automated line, it is important that several small-time repair and maintenance works are attended without calling the equipment companies. Most equipment companies are willing to contribute to designing a course which can address this need and also help in training the initial batches which can then be replicated. This can help the companies reduce the down time and overall service costs.

b. MOFPI / FICSI needs to work with select large Companies in each sector and see if their existing resources – Training methods / systems could be used for helping MSME firms in the given sectors – For E.g., *Suguna Poultry has developed a comprehensive Training Programs for all their employees on the Farm to Processing to End Markets value chain and MOFPI / FICSI needs to see if some of these best practices needs to be taken to smaller MSME players in the Poultry segment.*

c. Automation Equipment OEMs should compulsorily conduct Specific training programs with Hands On training on their Product application and Operation of the system.

d. FICSI could work with each Sub-Sector Industry Association on a periodic basis to assess if there are any other areas of Training which needs to be included for their Sub-Sectors.

8. Development of Online / Smart Phone based specific Training and Certification programs for the MSME & Entrepreneurs in Start-up units.

Indian Food processing industry is widespread and has units across the country and even in smaller towns. Formalized training either by FICSI or any other agency is limited to certain

towns and cities only. An Online Training and Certification Program can help in widespread reach in a much shorter time.

Some basic and specific subjects could be taken up for development of these Online / Smart Phone based training programmes. These could be:

1. Food Safety and Hygiene – Do's and Don'ts
2. Basic course on Machine operations
3. Basic course on Machine Maintenance
4. Basic course on Packaging etc.
5. Specific entrepreneurship programs in niche areas such as Bakery Craft, Chocolates, Dairy Cheese / Paneer etc.

For example – Asscom Institute of Bakery Technology & Management is running a Certified Bakery Science & Technology (BST) Online training course of 126 sessions of 1.5 hours each for 63 days.

9. Government of India should fund prospective companies to implement Industry 4.0 solutions and also provide for upskilling of employees.

Industry 4.0 gives the results based on various sensors installed in the system related to productivity per shift; idle machine time and idle manpower; etc. which would allow companies to take corrective measure to increase their productivity. This increased productivity will also require higher skilled personnel to implement and monitor the Industry 4.0 solutions.

- Currently the plant automation and advanced technology are being implemented by the large companies. **Certain incentives for small and medium enterprises will definitely boost the implementation for the benefit of the industry.**
- There is a tremendous scope for increase in skilled manpower for these Industry4.0. Current employees lacking such skills could be ideally upskilled to retain their employment.

10. <u>Awareness creation</u>

- One of the most common complaints coming out was the lack of awareness of any training programs for the Sector across the country
- MOFPI / FICSI needs to invest in making the right awareness creation tools such as advertising in vernacular / local newspapers / sponsoring & participating in certain sector specific events / seminars and exhibitions and specifically in States like Tamil Nadu where regional Television Channels have a very high recall rate, even consider Multimedia advertisements.
- Digital and Social Media tools could also be explored.

- Information on the 'Potential' and 'Growth prospects' of the FP sector in India needs to be communicated more frequently and in the right medium / language attracting more workers into the sector.

Formal Training

In our formal education system, the Food Processing Sector is hardly covered, and it is now required to be recognized as a key contributor to a nation's economy and needs to be formally included in our education system. There is a **pressing need to mainstream and get "Food Processing" and Information about key Subsectors in our Formal Education systems - 8th Standard onwards.**

Our discussions with various SME's and the industry in general gives us a sense that it is high time the Government of India develops manpower from a very early age and shows a career path to many of our students in the FP sector as the contribution of the FP is immense and likely to play a far more important role as we grow as a nation. It was also realized that we need to think about this very differently than our current formal education system to be more industry friendly than being an academic one. Our logic is explained below:

- **The current route to graduation (10+2+3) in Science/Commerce/Humanities creates a corpus of generally educated candidates who have no specific sectoral approach from the industry point of view.**
    - Industry is far from the horizon of the minds of these candidates.
    - For the Industry "Employability" of these candidates is critical.
    - The current industry need is to have (or create) a corpus of professionally educated candidates at various levels of employment in the industry without spending months in training & teaching the essentials of Food Processing.
- **We propose a 10+3Y Diploma or 10+4Y graduation course specifically for the Food processing sector.**
    - Candidates passing these courses (10+3Y Diploma or 10+4Y Graduation) Integrated course (refer the table below) will have a very updated understanding of Food Processing equipment, key processes, and systems.
    - They will also have a good idea of their prospects and positions in the industry, their roles and work expectations.
    - Certain universities are already running B VOC courses – this needs to be strengthened
- **With a 3 Month mandatory "Certified Training program", such B.F.Pr. Graduates are definitely "Employable" and can be productive on the job within 1 Week of induction & orientation in the Factory on the job.**

We present below a roadmap for formalizing Food Processing Education in India in the Table below:

Level	Overview	Syllabus suggestions	Methodology
Schools – 8th / 9th / 10th Standards	Conceptual understanding of food chain, RM conversion & Distribution All conceptual Understating Only	Introduction To food Chain Concept of Sub-Sector Part of Social Studies Subject / EVS Food Safety, Diseases arising out of unhygienic Food & Process	Visual movies on Food Production Factory visits Gradual increase in intensity from 8th to 10th at least 10 visits in 3 years to at least 1 Visit / Sub Sector (if possible, nearby else whatever is available in the district) NO EXAM
Diploma – 3 years	First 2 Years common syllabus 3rd Year specialization in 2 subsectors ---------- Employed at operator level Can rise up to Sr. Executive (1 line below Manager category)	Covers all 10 subsectors in first 2 years Food Science / Chemistry in each subsector Food Processing steps in each sector Food Processing testing Food Safety – Common to all sectors HACCEP Fundamentals -Food Preservations Techniques Food Processing equipment Cold chain /Food Preservations	4 Months / Year in plant work of which 1 month is on field 6 month / Year classroom study Final year focus is on 2 sub sectors only
Degree – 4 years	Food Processing Processes Innovation Engineering concepts And all others at Diploma level	Covers all 10 subsectors Details of Production / QC / Testing in each subsector	3 Month/Year In-plant training in first 2 Years 6 Months In-plant training + on field training for Y3 and Y4

Level	Overview	Syllabus suggestions	Methodology
	---------- Starts as an Asst. Manager Can rise up to Regional Manager, Branch Manager	Production Planning / Production analysis / Data Analysis / storage / Food Engineering / Equipment Food Preservation Technology – Canning / Chilling /Fermentation / Pickling etc.	10 assignment /Year 1 assignment per month on a specific topic related to the syllabus.
Postgraduate – 2 years	Food Technology - Research Specialization Food Processing - Marketing & Business Development ---------- Starts as Regional Manager Branch Manager Factory Manager Production Manager Can go up to Director / GM / VP	2 streams: Research and Business Management R&D: separate syllabus on Research Business management: Separate syllabus of MBA	Internship: 6 Months / Year Classroom: 4 Months / Year Improvement Project: 1 workable, Innovative and answers customers' unmet needs

Table 202: *Roadmap for formalizing Food Processing Education in India*

The entire 10 year action explained above is summarised in this Chart below:

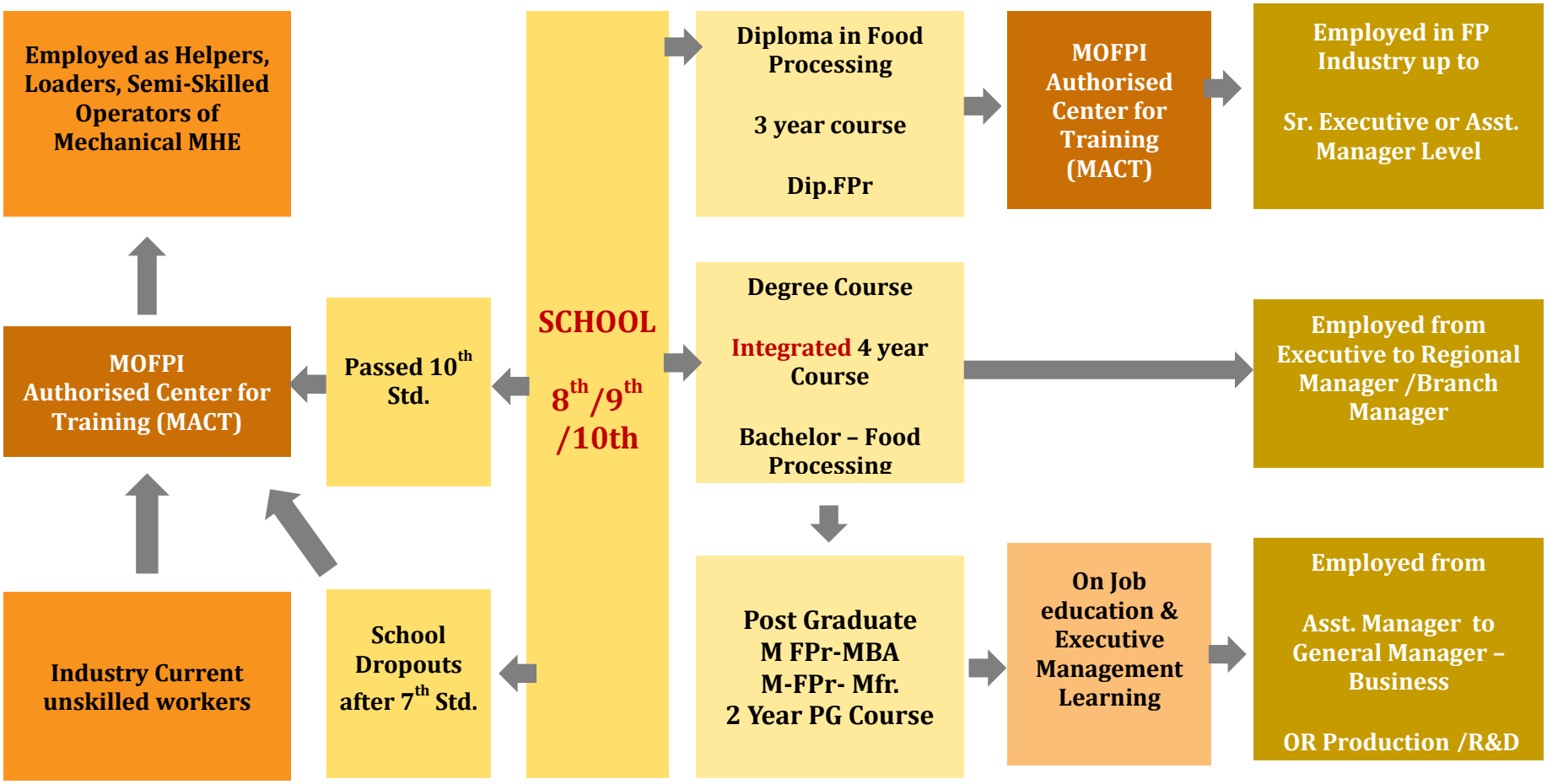


Figure 208: Summary of the 10-year action plan

Sub-Sector level Action Points

Bread & Bakery Products

Considering the nature of the industry which is highly fragmented with more than 3,00,000 bakeries which is growing every year, the sector has huge potential for training. In addition, there is huge requirement of R&D Professional in Bakery Industry. Also, it is to be noted that more 30,000 Indian Bakery Chefs/Technologists are working in abroad. There are lots of opportunities of Indian bakers in international market.

Training the Candidates on Multi Functions

- Multiskilling is the key by introducing them to multiple skills required by the industry so that the employee can be filled in across any functions. Also, at the minimum, people need to teach the basics of milling and further processing which will develop a much-rounded skill set in bakery.

Specializations needs to be created in the formal training curriculum

- Currently there are no specialization offered to students to choose their interest area / career in specific sub-sectors within food processing industry. It is expected that creating such specializations will create more customized curriculum, training and practical knowledge for the students and they will be job ready when they join any processing company.

Visibility of Training Institutes offering technicians.

- With the limited awareness of the institutes offering bread and bakery product training programs, it is expected that more institutes to be operated across states. Introduction of more online training programs to make skilling available at a National level

Food Safety related programs

- The food safety may be the first and foremost concept for the Government to give training to each and every person. It becomes extremely important to sensitize employees on the importance of maintaining stringent hygiene standards. This is one area where the government needs to lay a lot of emphasis on.

Dairy Products

Formulation of Council and upgradation in academic qualification

- Formulation of professional council to promote, regulate and standardize Dairy education in India and maintain register of dairy technologists in the pattern of Council of Architecture, Veterinary Council of India etc.
- Further, the requirement to have a technical manager with science or technology as qualification as per FSSAI to be partially modified to degree in dairy technology only.

Formal training institutes are expected to offer intense practical training / internship.

- Formal training institutes are expected to change the curriculum based on the changing needs of the industry. Moreover, it is expected that practical training or internship with the dairy plant should be mandatory process for the graduation completion.

Need for Specialized Training Institutes across every state.

- With the limited awareness of the institutes offering dairy related vocational training programs, it is expected that more institutes need to be operated across states. Institutes can tie-up with the co-operative units to co-train the prospective manpower in the sector. Specialized programs offering training across functions for the semi-skilled or unskilled employees to be created.

Data Analytics – New jobs on Demand

- Dairy plants and other food processing sector deals with tons of data. These data have to be used for the benefit of the company in terms of demand forecasting, raw materials supply forecasting, productivity monitoring and optimize the machine running time, predictive assessment of market, etc. Industry would need these skills going forward for their self-growth as well as industry growth

Creating a portal listing of trained manpower

- Dairy plants are facing a major challenge in finding the skilled or semi-skilled employees. Companies are expecting that FICSI can list down the students got trained for the QPs generated by FICSI in their portal which can be accessed by the companies.

Fish & Seafood Processing

There are many training institutes on fisheries and aqua culture. But the institutes offering training programs for the fish and seafood processing is very limited in India. Following are the key expectations from the industry.

Need for Specialized Training Institutes in Key Clusters

- Specialized training institutes that cater to the needs of the fish and seafood processing industry should be developed in the key clusters like Veraval, Kochi, Chennai, Ratnagiri, Kolkata, etc.

- As on now, the fish and seafood processing companies have limited awareness about the current training infrastructure in the country. There are various companies in the coastal areas like Kochi, Veraval, Ratnagiri, etc. are ready to offer internship programs to train the manpower.

Training Programs Focusing Operator Level Functions & Women Employment

- Around 80% of the total manpower perform operator level functions and 80- 90% of the operator level employees are women employees. Almost 100% of these employees are unskilled employees and on-the job training are provided to the employees

- Training programs designed to these stakeholders (Women employees at operator level), primarily focusing cleaning, sorting, grading, cutting, conditioning, wrapping, etc. would benefit the industry.

Continuous Training

- Higher attrition among women employment drive for the continuous training support for the industry. There will be less productivity in the industry for the specific months every year when the fisheries are not allowed. Processing companies are expecting to utilize those timelines for the training support for their existing employees.

Offering Practical Training Courses

- Offering certification at the lower level where the course involving practical work experience in addition to academic study

Fruits & Vegetable Processing

Need for highly trained Fruit technologist & agronomist

- The industry current lacks 'Fruit technologist' who can play a major role in developing new products for the market. Agronomist is also an extremely critical role. An Agronomist can understand the details on the plant and the pesticide usage but is also aware of the rules and regulations for the international markets.

Requirement for training on multiple techniques used in F&V processing

- There are multiple technologies that are used in the F&V processing like Freeze drying, dehydrating, canning, packaging, etc. A trained worker who has the knowledge about all these techniques along with the basic understanding of the F&V process (sorting, grading, tip cutting, etc.) would be really helpful for the industry.

Training Programs on Industry 4.0

- The industry is witnessing an increased application of innovative technology to increase productivity. Artificial intelligence (AI) is being implemented to examine fresh fruits and vegetables for defects, and accurately predict the exact date of decay. Nanotechnology is aiding in maintaining the freshness of perishables. Furthermore, grading robots are used to evaluate the quality of the produce to minimize manual errors. Cold plasma, high-pressure processing, irradiation, and radio frequency identification (RFID) are technologies that are mostly used in the fruit and vegetable industry in India.

- With these technologies currently being implemented by the industry, it is important that existing employees in the sector need upskilling and the freshers needs to be trained with these technologies.

Visibility of Training Institutes offering technicians.

- Industries are aware of various training programs designed by FICSI for Juice Processing, Jams/ Pickle / Dehydration / canning / ketchup processing etc. The challenge the industry face is to source the trained manpower for F&V processing.

- It is expected that more institutes are to be operated across F&V producing belts (primarily Maharashtra) and these institutes are expected to have presence in Tier 2 cities for better reach.

Higher Emphasis on 'Food Safety' & Hygiene Related Programs

- 'Food Safety' should be the first and foremost subject, to be trained for any person getting employed in the F&V processing. Prospective workers also need to be trained on how to handle products and the steps involved in food processing.

Meat & Poultry Processing

Modernization of slaughterhouse would require trained manpower

Modernization of municipal slaughterhouse would require trained manpower for respective operations. Certified capacity building programme should be introduced for veterinarians, meat inspectors, butchers, etc. Training programmes could be conducted on various topics such as

- Butcher personal hygiene and care
- Meat inspection
- Meat stall management and environmental sanitation
- Care and maintenance of butcher tools
- Equipment hygiene

Introduction of Undergraduate programme and training of women manpower

Industry expects new Undergraduate programs in meat processing technology. Ministry needs to focus on skill development programs for various job roles. This can help industries absorb people directly from the institutes without any prior training programmes. Manpower trained on automation will be a key factor for the development of this sector.

As of now, Women employees have limited role in the Buffalo meat processing. Initiatives needs to be taken to improve the role of women in this industry. Industry is also working towards introduction of value-added products in both Meat and poultry segments. These new products will generate demand and in turn will generate employment for the sector.

Milling (Grains & Oil Seeds)

Training program with specific focus on the milling industry required.

- Within the Milling industry, there is a need to introduce basic courses on crushing, and refining
    - There can be additional courses on oil milling machines and basic functions of these machines.
- Along with the basic course, there is need to train the millers on food safety along with the GMP and HACCP practices

Requirement for providing machine maintenance courses for Millers

- An example of good practice in US is the Association of Operative Millers (AOM) Kansas, who conduct courses for a week on mill maintenance, quality and operation systems which can be replicated in India to trained millers who are already employed in milling industry and those who are interested in it. With most companies having an automated line, it is important that several small-time repair and maintenance works are attended without calling the equipment companies. Most equipment companies are willing to contribute to designing a course which can address this need and help in training the initial batches which can then be replicated.

Training the Candidates on Latest Technologies

- Candidates across functions are required to know various functionalities (Grain silo, Milling, R&D, Warehouse operations, etc.). Increased use of automation and control systems mean that engineering and computer skills needs to be adequate across level of employees.
- The existing QPs of FICSI focuses on core functions of milling and they need to be updated with the latest technology in the industry.

Visibility of Training Institutes offering technicians.

- There are very few institutes which are well known in the industry like CFTRI, CSMT (Choyal School of Milling Technology) which offers technical programs on various milling technologies. Industry expects more such institutes across the states. Some of the Machine suppliers are ready to collaborate with the education institutes to offer practical training at their plant.
- Joint efforts of all the stakeholders (MoFPI/FICSI; Machinery Manufacturers; Millers & Education Institutes) will reduce the skill gap in the industry.

Beverages (Tea & Coffee)

Large-scale tea and coffee plantations and processors have started relying on unskilled migrant workers due to unavailability of local workforce for processing. The medium, small and micro tea and coffee processors currently work on a low level of mechanization and have opportunities to have better machines that save time. This does not impact manpower requirement but increases productivity.

Visibility of Training Institutes offering Technicians

- There are limited institutes, that are offering training related to Tea / Coffee Processing. More training institutes needs to be set up across the Southern region, East & North East (Tea & Coffee Processing clusters) part of the country. More online training programmes need to be introduced to make skilling available at the National level.

Sector Specific Job Roles

- As of now, there is no QP available with FICSI for tea / coffee processing. With the growth in the sector, there is a scope for introducing specific job roles like Tea Taster, etc. Tea Tasting is an important component of tea manufacturing and only few institutes across the country offer a course on that. A relevant QP/NOS can be developed for this since a considerable number of tea tasters are required in Tea clusters.
- There is also demand for System admins job in Tea or coffee garden offices for processing of data in applications like FoxPro and other tools.

RTE & RTC Products

Upskilling of existing employees

With tremendous growth potential of the industry, there would be requirement of skilled workforce at the entry and multiple levels. There are few areas where there are potential for upskilling people.

- R&D skills
- Technology and Project Management
- Quality and food safety
- Legal and statutory

Practical Training – Mandatory for both formal & In-formal Training

- A program to make students / probable recruits' industry ready before absorbing them into the organization. Program to work very closely with industries. Every industry needs to develop its own plans to work with academic institutes. Curriculum to include the regulatory requirements as well. This will add value to the recruiting organization.

Need for Basic Operator Training specifically for RTE / RTC industry

- More requirements are coming up in the Electropneumatic and Mechatronic technologies, which is required for automation. There are skill gaps within the current work force. FICSI needs to look at new technology-based job roles such as freezing systems, IQF, spiral freezers, packaging systems, chilling and cooling related like freon, retort packaging, MATS etc. Need for basic ITI operators trained in the operating and basic maintenance of the above equipment.

Higher Emphasis on 'Food Safety' & Hygiene Related Programs

- 'Food Safety' should be the first and foremost subject, to be trained for any person getting employed in the RTE / RTC sector. It becomes extremely important to sensitize employees on the importance of maintaining stringent hygiene standards.

Data Analytics – New jobs on Demand

- RTE / RTC sector deals with tons of data. These data have to be used for the benefit of the company in terms of demand forecasting, raw materials supply forecasting, productivity monitoring and optimize the machine running time, predictive assessment

of market, etc. Industry would need these skills going forward for their self-growth as well as industry growth.

Implementation support for Industry 4.0 and upskilling of employees

- RTE / RTC sector uses lots of automation in the current set up and also invests in new technologies. Industry needs budgetary support for implementation of industry 4.0 and upskilling of the existing employees on the latest technologies.

Soya Processing

Importance of Training

- Recruiting skilled manpower is a major challenge for this industry as there are limited no. of companies. Training plays an important role not only for the fresh candidates, but also for the existing employees. Industry expects to have a training program specific to Soya processing and not just as a part of Milling module.

Training for Multi-Functions

- As soya have multi usage applications, the training programs are to be developed for the Soya Processing and not just for applications like Bakery, Dairy, etc. Multiskilling would be key so that the employee can be filled in across any function (Processing machinery, packaging machinery operations, pre-processing, etc.)

Need for Practical Training

- Online training may not help here as the programme needs practical training. There would be need for vocational institutes / training Centres at the clusters to solve the manpower crisis of the industry.

Spices

Technology Increases Productivity & Manpower

- Currently the plant automation and advanced technology are being implemented by the large companies. Certain incentives for small and medium enterprises will definitely boost the implementation for the benefit of the industry.

Inclusion of curriculum / specialization on spice processing in Formal Education

- Within formal education, there is no specialization for spices and there is no curriculum focused on spice processing. Processing companies are willing to assist institutes for framing curriculum. The key expectations among these companies are to identify the institutes in major states like Kerala to introduce such programs or specializations.

Visibility of In-formal Training Institutes offering Training Programmes for Spice Industry

- As of now, spice processing technician is the only QP offered by FICSI. The challenge in the sector is the limited awareness of such programmes or the institutes offering spice processing technician and related vocational training programmes. There should be an

effort to showcases the training being offered for the sector and more such institutes to be operated across key states / clusters.

Higher Emphasis on Food Safety & Hygiene Related Programs

- Prospective workers also need to be trained on how to handle these spices and the steps involved in food processing. The food safety may be the first and foremost concept for the Government to give training to each and every person.

Cold Chain (Incl. Logistics)

Institutes offer a wide variety of courses, which includes undergraduate, postgraduate, diploma and certificate courses in areas, such as supply chain management, warehousing and transportation that includes a module on Cold Chain.

Need for Specialized Training Institutes focusing on Cold Chain

- Specialized training institutes that can cater to the needs of the Cold Chain industry should be developed. Current infrastructure covers overall Logistics and Warehouse skill development and not specialized programs for Cold Chain sector.

Collaboration with Equipment Manufactures and Cold Chain Industries

- Technical courses like refrigeration plant operators, mechanics and courses on new technologies need to be introduced with combined efforts from equipment manufacturers and the Cold Chain provides. Curriculum should be co-created with recommendations from the cold chain service providers, equipment suppliers and other stakeholders.

Creation of Training Infrastructure focusing on Tier-II cities along with Tier I cities

- Industry is expecting creation of regional training infrastructure covering Tier I and Tier-II cities. Cold chain infrastructure is being created in tier II cities and the training institutes growth to be correlated with it

Offering Sandwich Courses

- Offering certification or diploma programs at the lower level where the course involving practical work experience in addition to academic study
    - Example: If an institute offers 1 year program, it can be 6-month classroom training and 6 months practical training or internship with the large and medium cold chain service providers.

Annexure

Annexure 1: Additional Information on Food Processing Industries

Over the years agricultural production in India has consistently recorded higher outputs across a variety of products -:

- Cereals - second largest producer of food grains globally (284.95 million tons)
- Fruits & vegetables - Ranks as the second-largest producer of Fruits and Vegetables (F&V) in the world (311.7 million tons)
- Milk - largest producer of milk globally (176.35 MMT)
- Meat - largest livestock population in the world (7.7 MT of meat produced annually)
- Poultry - around 95.2 bn eggs annually
- Marine - second largest fish producer in the world (12.60 million metric tons)

The Food Processing sector has been positively impacted due to an abundant supply of raw materials, an increase in demand for food products. The industry has huge growth potential and the country's agro-climate zones provide a fertile ground for various plant-based edibles that cater to indigenous and global consumers.

Types of Food Processing

Food processing encompasses all the steps that food goes through from the time it is harvested to the time it arrives on consumer's plate. Processed foods can be classified into three types viz. Primary, Secondary and Tertiary.

The ***primary processing*** includes basic cleaning, grading, and packaging as in case of fruits and vegetables.

Secondary processing includes alteration of the basic product to a stage just before the final preparation as in case of milling of paddy to rice.

Tertiary processing leads to a high value-added ready-to eat food like bakery products, instant foods, health drinks, etc.

Most of the processing that is done in India can be classified as primary processing – done through rice, sugar, edible oil, and flour mills etc.

Processing level by Sub sector

Sub-Sectors	Components	Level of Processing (Approx.)
Dairy	Whole milk powder; Skimmed milk powder; Condensed milk; ice cream; butter; ghee; cheese	35%
Meat & Poultry	Frozen; processed, preserved and canned mutton, beef, pork, poultry and others	20% Buffalo Meat 6% Poultry
Fisheries	Frozen and canned products mainly in fresh form	8%

Sub-Sectors	Components	Level of Processing (Approx.)
Fruits and Vegetables Processing	Beverages, Juices, Concentrates, Pulps, Slices, Frozen and dehydrated products, potato wafers and similar products	2%
Consumer Foods	Packed Food; Aerated Soft Drinks; packed drinking water and alcoholic beverages	NA
Grains & Cereals	Flour, Bakeries, starch glucose, cornflakes, malted foods, vermicelli, malted extracts, grain-based alcohol	NA

Table 203: Processing level by Sub sector

While packaged food is the fastest-growing segment posting a double-digit growth YoY, currently only ~10% of its Agri output is being processed. Thus, given the high production levels along with low processing rates, the sector presents huge opportunities.

Gross Value Addition by Food Processing Industries

During the last 5 years ending 2018-19, Food Processing sector has been growing at a Compound Annual Growth Rate (CAGR) of around 11.62 per cent as compared to around 3.91 per cent in Agriculture and 8.30 per cent in manufacturing sector at 2011-12 Prices.

There are 18 product categories or sub-sectors under the food processing sector. According to the latest Annual Survey of Industries (ASI) for 2016-17, there are a total of 39,748 registered units and 2,459,929 Unincorporated Enterprises in the Food Processing sector in India.

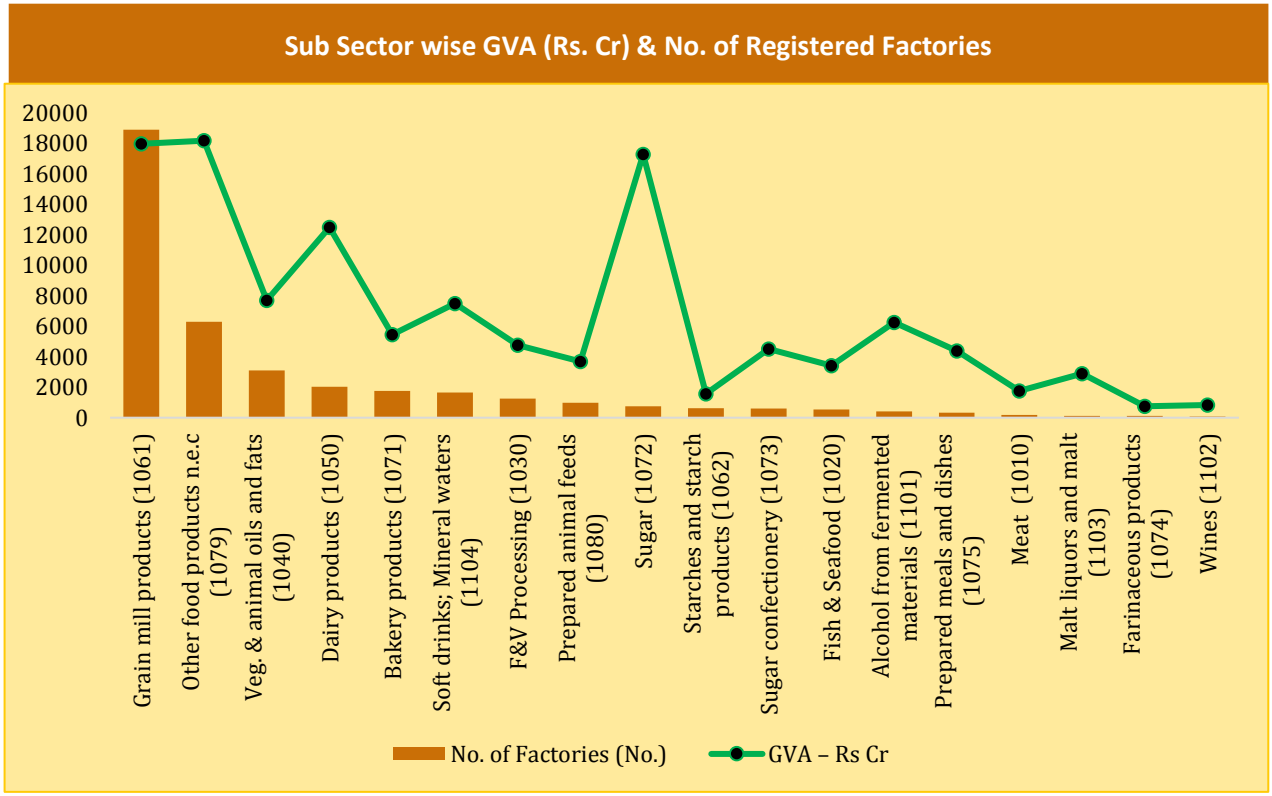


Figure 209: Sub Sector wise GVA (Rs. Cr) & No. of Registered Factories

With the widespread of HORECA and retail outlets and efforts to attract investment in cold chains and food logistics, the food processing industry is expanding sales in every category of processed foods increased significantly.

Industry sources estimate that over 400 million Indians regularly consume some type of processed food. Urban areas account for over 75 per cent of sales, as consumers seek convenience and quality. For higher-value frozen and refrigerated foods, sales are almost exclusively in urban areas.

Rural areas tend to have lower incomes and a preference for fresh ingredients. Nevertheless, rural areas are emerging as a market for well-priced, shelf-stable foods. Consumers in developed markets are more open to the idea of packaged food, which manufacturers often position for convenience, nutrition, and food safety.

State/UT-wise No. of Registered and Unincorporated Food Processing Units in India

In terms of the geographical spread of the food processing sector, Southern region has the highest numbers of registered factories with 47% of the total registered factories in food processing industries *(Andhra Pradesh accounting for about 15% followed by Tamil Nadu accounting for about 13% and Telangana accounting for about 10%)*

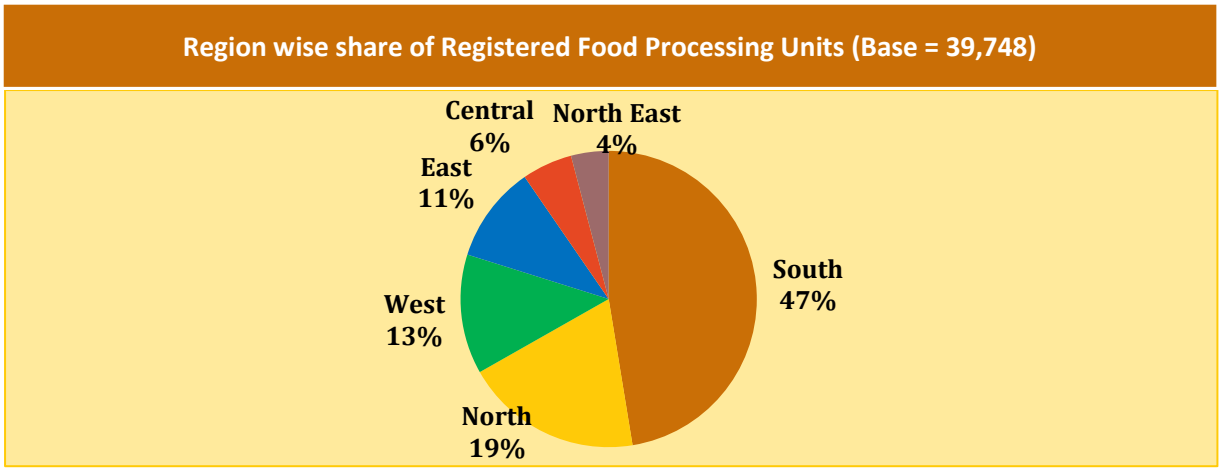


Figure 210: *Region wise share of Registered Food Processing Units*

Exports of Processed Foods

Indian agricultural/horticultural and processed foods are exported to more than 100 countries/regions; chief among them is the Middle East, Southeast Asia, SAARC countries, the EU, and the US. However, India's total agriculture export basket accounts for a little over 2% of world agriculture trade and Agricultural exports' contribution to India's GDP is also as low as 2%.

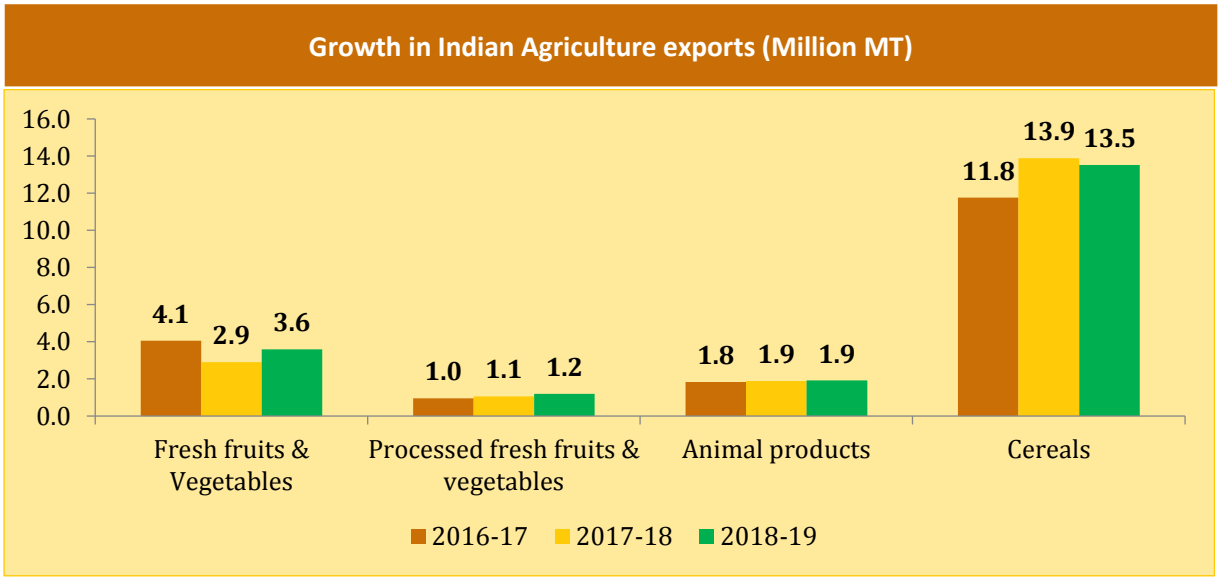


Figure 211: *Growth in Indian Agriculture exports (Million MT)*

Export Trend by Food Commodity

Majority of Indian exports are low value, raw or semi-processed and marketed in bulk which are then processed in other countries, indicating the scope to move up the value chain. The share of India's high value and value-added agro produce in its agriculture export basket is less than 15% compared to 25% in the US and 49% in China

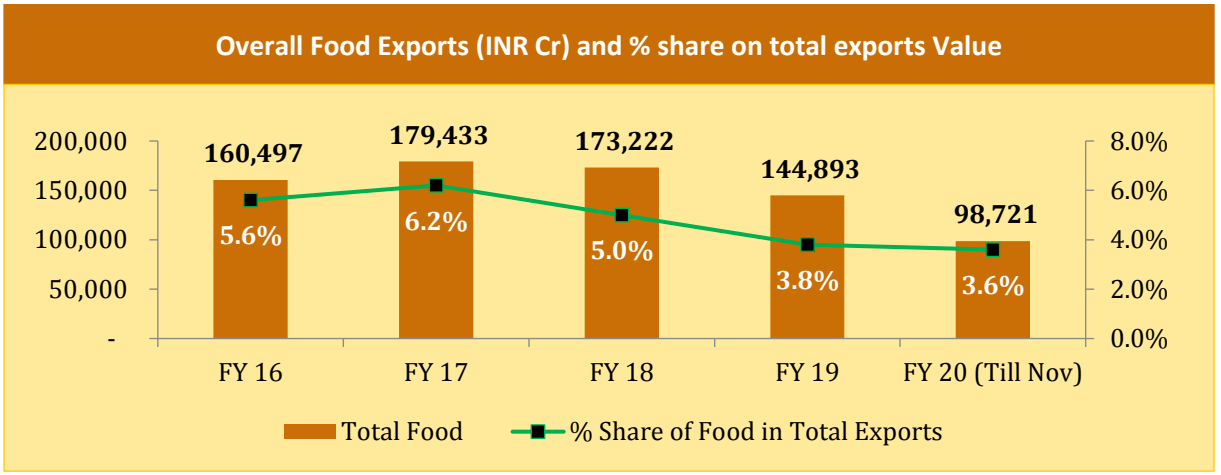


Figure 212: *Overall Food Exports (INR Cr) and % share on total exports Value*

Employment in Indian Food Processing Industries

Food Processing Industry is one of the major employment intensive segments constituting 12.43% (at 3-digit of NIC classification) of employment generated in all Registered Factory sector in 2016-17. According to the latest Annual Survey of Industries (ASI) for 2016-17, the total number of persons engaged in registered food processing sector was **18.54 lakhs.** Unregistered food processing sector supports employment to 51.11 lakh worker as per the NSSO 73rd Round, 2015-16 and constitutes 14.18% of employment in the unregistered manufacturing sector.

The trend from 2010 – 11 to 2016 – 17, is given in the chart below

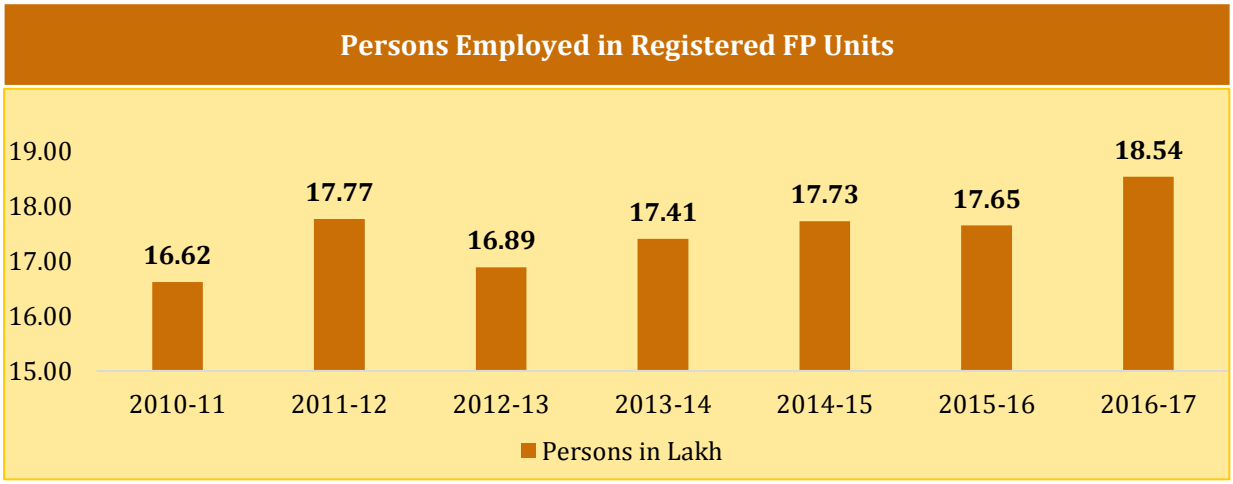


Figure 213: *Total number of Persons Employed in Registered & Un - incorporated units in the FP Units*

Source: MOFPI Annual report

The overall employment in the Food Processing sector is shown below in the table:

Sector	Food Processing Industry*	Overall Industry	% Share of FP Sector
Registered# (2016-17)	18.54 lakh	149.11 lakh	12.43
Un-incorporated (2015-16) **	51.11 lakh	360.41 lakh	14.18

**: Includes food products and beverage segments*

#: Source: Annual Survey of Industries 2016-17

***: Source: NSSO Report No. 582 (73/2.34/2) on Economic Characteristics of Unincorporated Non-Agricultural Enterprises (Excluding Construction) in India; NSS 73rd Round (July 2015-June 2016)*

Table 204: *Past trends on the overall employment in the Food Processing sector*

Government Initiatives

Food processing sector is seen to have a potential to provide alternate employment opportunities to rural youth, who are currently dependent on agriculture or moving to urban areas for employment. Sine a large section of the population is dependent on agriculture and allied sectors, the income enhancement of such a large section of population is possible only through adding value in the food chain. Government of India has accorded high priority status to food industry with an objective to reduce inefficiencies resulting in wastages/ losses by setting up infrastructure (expect cold storage facilities) and generate huge employment in this sector. Some key government initiatives and support and discussed in detail below

Pradhan Mantri Kisan Sampada Yojana

- In February 2020, under the Pradhan Mantri Kisan Sampada Yojana, the Indian Ministry of Food Processing Industries (MoFPI) sanctioned 39 mega food parks (MFPs) and 298 integrated cold chain projects across the country
    - The initiative was introduced to fill the gaps across the value chain in the country, to facilitate seamless transfer of perishables from production to consumption areas
    - For the creation of backward and forward linkages in the industry, 58 projects have been approved by the government. Additionally, for the development of agro-processing clusters, approval for 45 projects across the country has been granted
    - Furthermore, 219 projects, aimed at creating and expanding food processing and preservation capacities in the country, have also been approved
    - Under the Operation Greens scheme included in the Pradhan Mantri Kisan Sampada Yojana, five projects have been approved by the government and are currently under operation
- The logistics disruption in the country is being taken care of by leveraging the existing PM-Gram Sadak Yojana, Sagarmala, Bharatmala and Udaan schemes

Illustrative Mega Food Park

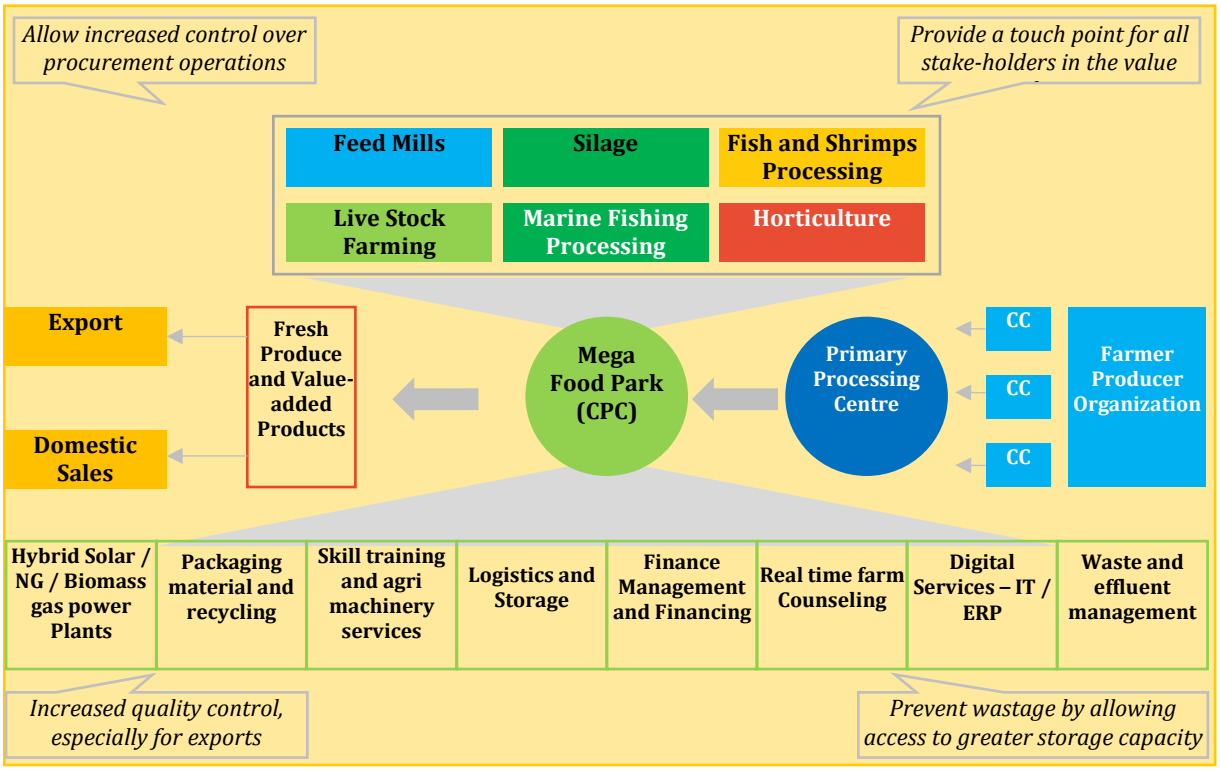


Figure 214: Illustrative Mega Food Park : Key Stakeholders

Atmanirbhar Bharat Abhiyan

- In May 2020, a scheme of INR 100 Bn was announced under the Atmanirbhar Bharat Abhiyan, for the formalization of micro food enterprises. In June 2020, the Prime Minister Formalization of Micro Food Processing Enterprises (PM-FME) scheme was launched as a part of the Atmanirbhar Bharat Abhiyan
    - The PM-FME scheme, with an outlay of INR 100 Bn, is to be implemented for five years, from FY 2021 to FY 2025. The scheme is expected to create ~900,000 employment opportunities (skilled and semi-skilled jobs) and generate investments of around INR 350 Bn
- On 10th June, 2020, under the Atmanirbhar Bharat Abhiyan, the Operations Green Scheme was extended to all fruits and vegetables (TOTAL) on a pilot basis, for six months. Previously, the Ministry had formulated the scheme for integrated development of the Tomato, Onion and Potato (TOP) value chain

Production Linked Incentive Scheme for Food Processing Industry (PLISFPI)

- As a part of Prime Minister's announcement of Aatmanirbhar Bharat Abhiyan, Government of India approved a new Central Sector Scheme 'Production Linked Incentive Scheme for Food Processing Industry' for implementation during 2021-22 to 2026-27 with an outlay of Rs. 10,900 crores
- The key objectives of the scheme are the following -:
    - Support creation of global food manufacturing champions
    - Strengthen select Indian brand of food products for global visibility and wider acceptance in the international markets.
    - Increase employment opportunities of off farm jobs
    - Ensuring remunerative prices of farm produce and higher income to farmers.
    - Support Food manufacturing entities with stipulated minimum Sales and willing to make minimum stipulated investment for expansion of processing capacity and branding.
- Key Target segments
    - Ready-to-eat/ready-to-cook food items.
    - Marine products
    - Processed fruits and vegetables
    - Mozzarella cheese
    - Innovative/organic products of SMEs including free range such as eggs, poultry meat and egg products.

- Key Expected outcomes

Key Outcomes: Estimated Outgo, Sales, Investment, Employment & Exports	
Outgo on Incentive (₹ Crore)	**10,790**
Increase in Sales- 6 Years (₹ Crore)	**1,20,267**
Incremental Sales in 6th Year (₹ Crore)	**33,494**
Cumulative additional Investment (₹ Crore)	**6,057**
Increase in Export Sales- 6 Years (₹ Crore)	**27,816**
Increase in Employment end of Year-5 (Nos)	**2,47,730**

Table 205: Key Outcomes - Estimated Outgo, Sales, Investment, Employment & Exports

FDI Equity Inflow to Food Processing Industries

India has significantly improved its rank in World Bank's Ease of Doing Business Survey 2019, and is ranked 77th, a leap of 23 ranks over last year ranking, among 190 countries assessed by the World Bank. The continued efforts on improving ease of doing business will in the long run help boost investor confidence.

Backed by the enabling business environment, FDI inflow into India food processing industry has been increasing steadily.

The Government of India has permitted 100% foreign direct investment (FDI) in the food processing industry under the automatic route. 100% FDI is allowed through government-approved route for trading, including through e-commerce in respect of food products manufactured or produced in India

- The country had received INR 58.97 Bn of foreign inflow in FY 2018 and an FDI of INR 45.46 Bn in FY 2019
- In FY 2020, the FDI in the Indian food processing sector witnessed a growth of ~44%, reaching INR 68.45 Bn
    - The sector received ~INR 35.17 Bn of foreign inflow in the first half of FY 2020
    - In the first quarter of FY 2020, a maximum foreign investment of INR 18.54 Bn was made in Tamil Nadu and Puducherry
    - Maharashtra, Dadra and Nagar Haveli and Daman and Diu received a foreign inflow of INR 1.90 Bn in Q1 of FY 2020
    - A foreign investment of INR 1.78 Bn was made in Delhi and part of Uttar Pradesh between April and June of FY 2020

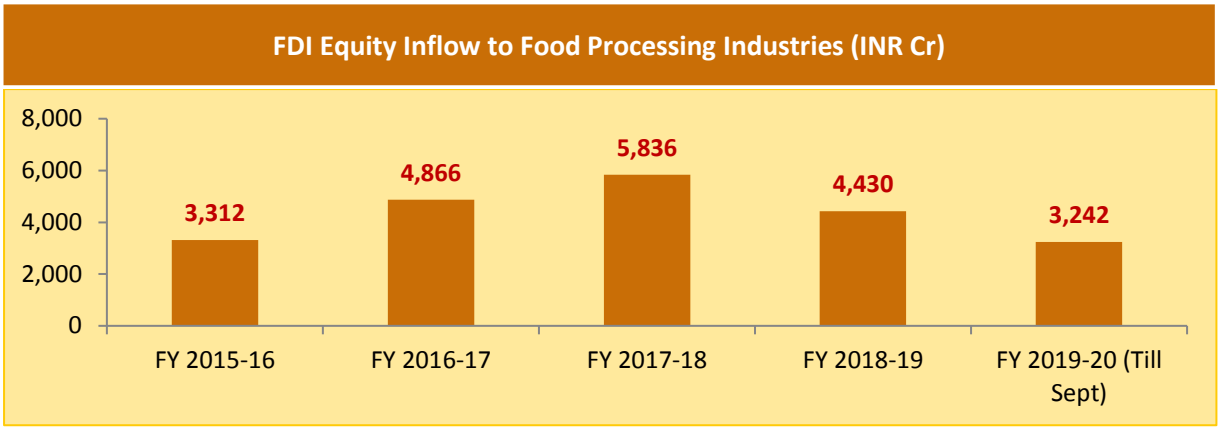


Figure 215: FDI Equity Inflow to Food Processing Industries (INR Cr)

Technology Impact in Food Processing

"Industry 4.0" refers to the digitization of manufacturing and the increasing digital connectivity of product, process, and factory. This technology allows for greater communication between machines, and machine-level processing of data allows them to adapt instantly to new production requirements. It also refers to the connecting of information systems and sharing of data across the supply chain to improve efficiency.

Food processing companies are likely to benefit from the implementation of Industry 4.0 more than most industries.

- **Quick to Market:** The ability of technology connecting the production facility with distributors implies the product gets to market more quickly.
    - This enables for "freshness" to be maintained
- **Traceability:** Interrelation of various components of the supply chain is likely to enable end-to-end traceability
- **Predicting Demand and Plan the Supply:** The data or analytics will help predict consumer demand and benefit from increased efficiencies.
    - This is expected to lead to a reduction in demand-supply gaps

While there are many benefits of Technology in Food Processing Industries, there are few challenges as mentioned below

Under Development: The technology for linking manufacturing and supply chain is still under development. It requires collaboration and a high level of trust between diverse businesses at the production, processing, wholesale, and retail levels. Sharing that much information does not come naturally to companies. This kind of transparency also requires improvements in Internet security.

Additional CAPEX: Many food and beverage companies are currently using processing and packaging equipment that was installed well before the IoT became a reality with a significant capital overlay. Replacing it may not be an immediate possibility. This manufacturing equipment may have years of useful service remaining if companies can upgrade the electronics, the drives, and software.

Skilled Workforce: Another concern for many manufacturers is finding the ideal labour force to run their transformed facilities.

Drivers of Technology in Food Processing	Impact of IoT / Industry 4.0	Extent of Impact	Ease of Implementation
Food Safety	Identification and containment of foodborne illness and recall/loss through blockchain	High	Low
Automation in Manufacturing	Exploring automation and predictive maintenance to reduce dependence on manpower and improve efficiency	Very High	Moderate
Regulatory Impetus	FSSAI compliances for label claims, packaging, freshness, along with impetus to processing under Make in India and SAMPADA schemes	High	High
Regional to National Brands	Scale-up capacity in-line with demand through predictive analytics and use of IoT to be able to react to demand fluctuations	High	Moderate

Table 206: *Drivers of technology in FPI and extend of impact and ease of implementation*

Industry 4.0 offers the opportunity to be prepared and also to benefit from the changing consumer behaviour while helping overcome the resource limitations from the supply side. However, a sustainable partnership model is essential between government, private firms and industry bodies for promoting Industry 4.0.

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