ASCI
Agriculture Skill Council of India

ENVIRONMENTAL

SCAN September 2023

MIND THE GAP

AGRICULTURE SKILL COUNCIL OF INDIA

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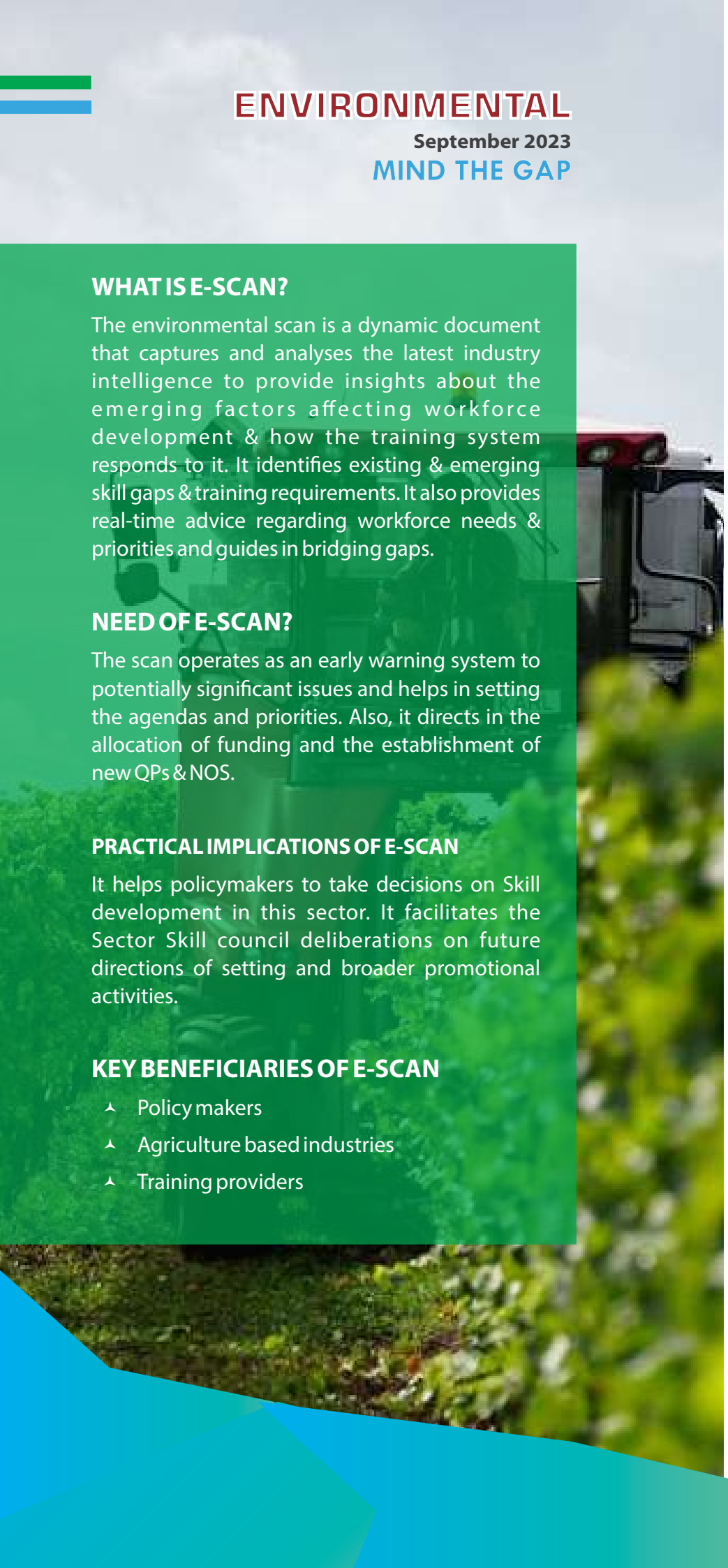


WHAT IS E-SCAN?

The environmental scan is a dynamic document that captures and analyses the latest industry intelligence to provide insights about the emerging factors affecting workforce development & how the training system responds to it. It identifies existing & emerging skill gaps & training requirements. It also provides real-time advice regarding workforce needs & priorities and guides in bridging gaps.

NEED OF E-SCAN?

The scan operates as an early warning system to potentially significant issues and helps in setting the agendas and priorities. Also, it directs in the allocation of funding and the establishment of new QPs & NOS.

PRACTICAL IMPLICATIONS OF E-SCAN

It helps policymakers to take decisions on Skill development in this sector. It facilitates the Sector Skill council deliberations on future directions of setting and broader promotional activities.

KEY BENEFICIARIES OF E-SCAN

- Policy makers
- Agriculture based industries
- Training providers

2023 ENVIRONMENTAL SCAN

MIND THE GAP

CONTENTS

Introduction

Overview of Agriculture & Allied Sectors in Indian Economy

Agriculture is the main driving force of the Indian Economy and is the primary source of livelihood for 58% of India's population. In the past years, the hardworking farmers supported by government initiatives ave produced agricultural commodities in record quantities. In FY18, the gross value added by agriculture, forestry and fishing is estimated at Rs. 39.45 trillion.

India, the resource rich country is the 10th largest arable land resources in the world with 15 major climates in the world and 20 agro - climatic regions. Also, India is home to 46 out of 60 soil types in the world. India stands first in production of milk and many of fruits and vegetables. India is among 10 leading exporters of agricultural products in the world. Agricultural exports reached US $ 36.60 billion in FY20 and US $ 52.70 billion during FY23. The agricultural export policy 2018 aims to double the agricultural exports by 2022. India was at 10th rank among the global exporters of agricultural products as per WTO trade data 2023.

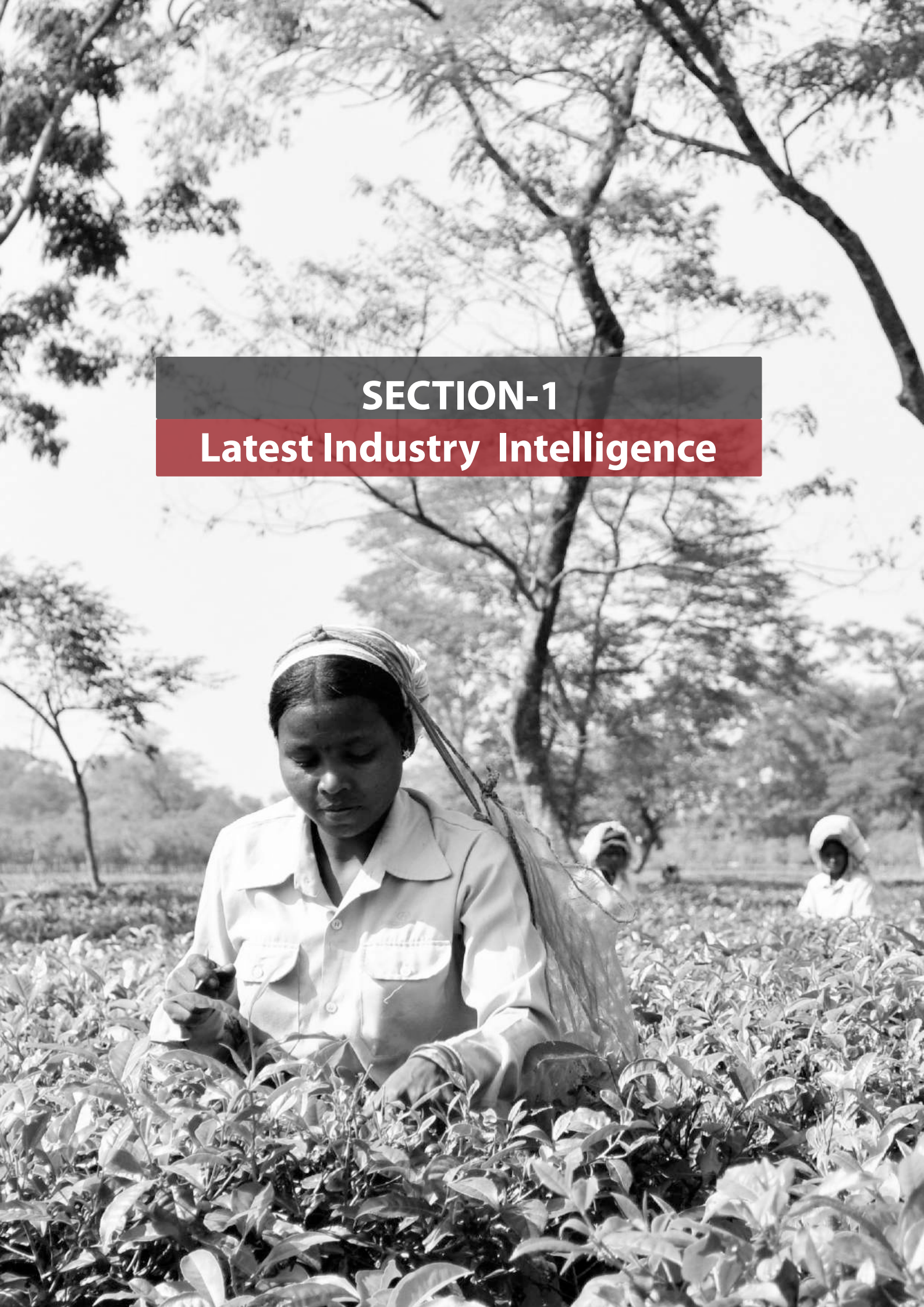
The Indian agricultural sector is expected to generate better momentum in upcoming years due to Government Initiatives & Investments in the sector. Agriculture Machinery & Agricultural services segments have together attracted a foreign direct investment (FDI) equity inflow of US $ 91.62 million in the year 2016-2017 and US $ 272.18 million in 2022-23 as per Government of India records.

Budget Allocation

Budget allocation to agricultural sector has seen a raise of 121%, i.e. from 56700 crore in the 2018-19 budget to 125036 crores in the 2022-23 budget. In continuation to various schemes such as Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), Fasal bhima yojana, current budget launched Agriculture accelerator fund to support Agri-startup by young entrepreneurs and sub-scheme under PM Matya Sampada to increase efficiency of the value chain.

The crop loan to farmers to be increased to Rs. 21.55 lakh crore in the year 2022-23. The budget also supported computerization of 63,000 Primary Agricultural Credit Societies, switching of 10 million farmers to natural farming and PM Pranam for alternate fertilizers, digital infrastructure to increase access to farm inputs, market intelligence and marketing.

The Indian Institute of Millet Research, Hyderabad, will be supported as the Center of Excellence for Sharing Best Practices, Research, and Technologies in order to make India a global hub for "Shree Anna".



SECTION-1
Latest Industry Intelligence

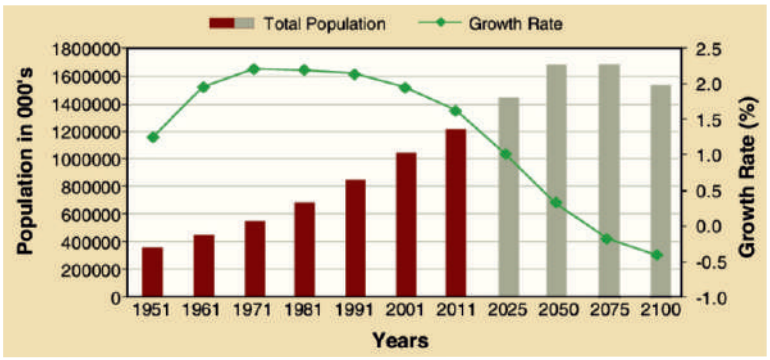
Section 1 - Latest Industry Intelligence
Macro Environment

'Broad factors and emerging trends beyond agriculture and which sit at an international and national level. The impact may be direct or indirect but will have a bearing on the skills and workforce development needs of the industry'.

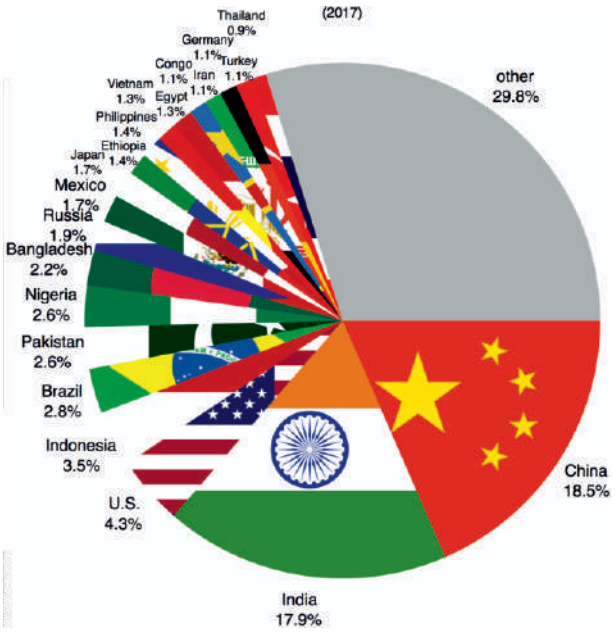
Population Wave

The world population has exceeded 8.09 billion in march 2023 & continues to grow at an alarming rate. India being the second populous country in the world holds a population of 1.40 billion accounting for 17.9% of the world's population. Only 2.4% of the world's land area is occupied by India. The growth rate of India is more than in China. It is predicted that India will surpass China in the upcoming years. Ironically, India is the first country to adopt family planning way back in 1952. The population of India has increased 3.35 times since Independence. India holds a population density of 455 people per sq.km. Uttar Pradesh & Sikkim are the most & least populous states in India respectively. Population outbursts can create intense crises like climate change, shortage of food, severe energy emergencies, etc. It can result in fierce competition between states, communities & even families for the nation's limited resources. A Country's person will be an asset to the economic development of the nation if he is enabled to sustain his livelihood.

The increasing population is leading to the fragmentation of landholdings which ultimately results in the lowering of soil productivity. Eminent agricultural scientist M.S Swaminathan warned that 'the situation is deteriorating rapidly & entire farming sector is heading for a total collapse if no rapid remedial measures are taken'.



Population growth rate of India



World Population Percentages

Economy

The driving force:

India is one of the fastest growing economies in the world. In the year 2022-23, the GDP of India grew at the rate of 7.0% being recovered from COVID-19 effect. Labour forces in India was 472.53 million in the year 2023 as per the PLFS survey. Due to the increase in the rate of population there has been proportional increase in the labour and higher education enrolment. India's gross domestic product (GDP) is expected to reach US$ 7 trillion by FY30 and become third largest economy in the world and achieve

upper-middle income status on the back of digitization, globalization, favorable demographics, and reforms.

India's revenue receipts are estimated at Rs. 23.48 trillion in the year 2022-23, owing to Government's constant measures to strengthen infrastructure and reforms like demonetization and Goods and Services Tax (GST). India is also focusing on renewable sources to generate energy. The energy generation from non-fossil sources stood at 43.82% with 186.46 GW as of 2023 and per cent of the energy from non-fossil sources would increase to 50% by 2030. India stands at 4th position globally in renewable energy sources.

India is expected to be the third largest consumer economy as its consumption may triple to US$ 7 trillion by 2025, owing to shift in consumer behaviour and expenditure pattern, according to a Boston Consulting Group (BCG) report; and is estimated to surpass USA to become the second largest economy in terms of purchasing power parity (PPP) by the year 2040, according to a report by Price water house Coopers.

Rise in Per Capita Income

Per capita income is primitive indicator of a country's prosperity. India's per capita income has reported at Rs. 172000 per annum in 2022-23 which is doubled from the year 2014-15 as per the data of Ministry of Statistics & Programme Implementation.

Gross National Income raised 13.98% from Rs 233.19 lakh crore in 2021-22 to Rs. 265.79 lakh crore in 2022-23.

As per the IMF world economic outlook, India ranks 139th among 192 countries in terms of per capita income. The rise in per capita income increases the purchasing power of consumers which ultimately results in greater demand for food and other consumption items. As consumers become aware of options availing, they go for a diversified food basket.

Climatic Variability

The increasing climatic variations in the different parts of India are taking a toll on agricultural production for decades and it is the need of the hour for India to take necessary mitigation strategies to cope up with the change in order to save the future of the nation. The agricultural systems are facing perilous situations due to the extreme variability in different states adversely affecting the crop production, challenging the risk management strategies and ultimately increasing the food security concerns. In the past decade India has been adversely affected by droughts in districts of Maharashtra, floods in Kerala and cyclones in Odisha and West Bengal. But it stood robust with then implemented mitigation strategies of the government to keep the toll to a minimum. According to a report released by the World Bank for South Asia, India will lose 2.8% of its GDP by 2050 with 1-2% increase in the temperature.

India ranks 10th on the global climatic risk index and third on the global carbon emissions with a contribution of 6.1 % (40.9 GtCO2) in 2022. A study by the IMF, (2017) finds that for emerging market economies a 1degree Celsius increase in temperature would reduce agricultural growth by 1.7% and a 100 millimetres reduction in the rain would reduce growth by 0.35 percent. An increase in average temperature, a decline in average rainfall and an increase in the number of dry-days are the climatic factors that are reported to have a huge impact on farm performance.

Climate-Smart Agriculture is an approach for transforming and reorienting agricultural production systems and food value chains so that they support sustainable development and can ensure food security under climate change. It is an innovative approach for charting development pathways that can make the agriculture sectors more productive and sustainable and better able to contribute to climate change adaptation and mitigation.

It pertains to implementing certain agricultural practices like minimum tillage, different methods of crop establishment, nutrient and irrigation management, and residue incorporation, etc. in the fields.

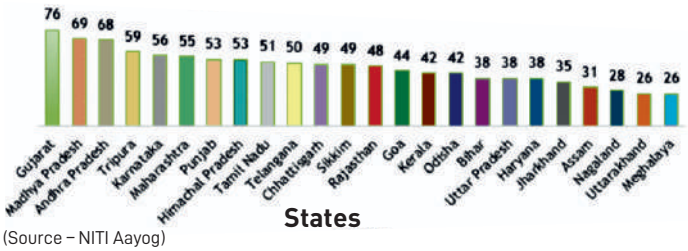
Water Scarcity

Every drop counts:

Water scarcity has a huge impact on food production. Without water people do not have the means to irrigate their fields and, therefore, to produce food for the fast-growing population. According to the International Water Management Institute, agriculture, which accounts for about 70% of global water withdrawals is constantly competing with domestic, industrial and environmental uses over the scarce water supply. Agriculture utilizes 86% of the available groundwater.

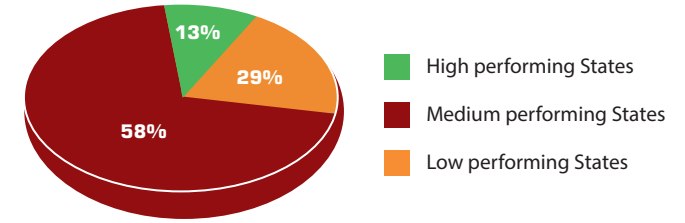
The reservoirs and groundwater are the main sources for refurbishing water depletion. The effects of this scarcity will deprive 40% of Indians of access to pure and drinking water by 2030. At present, 600 million Indians are facing water stress. The situation will worsen for water availability by 2050 as the demand for water will increase. This situation can only be dealt with specific measures and water management strategies that need to framed by the government in order to meet this need.

Water Management Score (In%)



(Source – NITI Aayog)

Water Management Performance of states in India



The CWMI of NITI Aayog is the first step towards strategic water management practices, by gathering information at the state level water resources pertaining to the laws of groundwater exploitation. The index aims to enable data-backed water management practices in the states and measure their performance by a benchmark on their water-saving capacity at different levels. The 2022 irrigation statistics show the total area under irrigation to be 73 million ha. Irrigation techniques have undergone evolution in the past decade with drip, sprinkler, and micro-irrigation on the rise.

Water scarcity being a major concern demands reduction in wasteful irrigation and adoption of more judicious and efficient irrigation systems. The farmer-water school initiative under the Uttar Pradesh Water restructuring Project (UPWRSP) aims to increase the tactical and strategic approach of farmers towards efficient water management due to groundwater depletion. The water supply in India is going to be a serious challenge due to the growing population which is likely to increase to 1.67 billion by 2050.

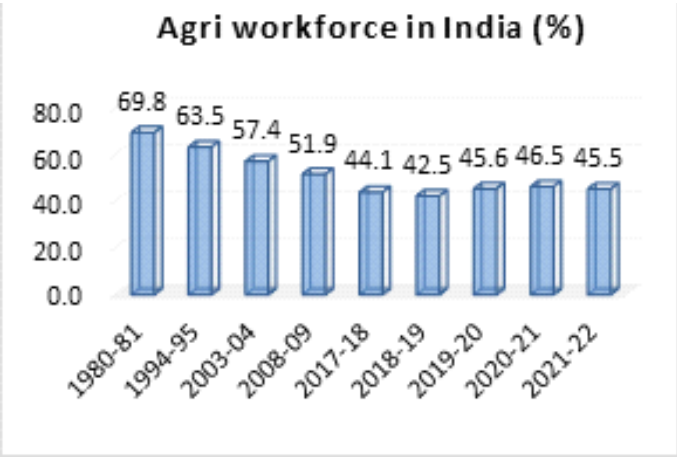
Agricultural labourforce

A large section of workforce in India is engaged in agricultural activities. As per the latest data available from Periodic Labour Force Survey 2022-23, nearly 53.8 percent of male workers and 75.4 percent female workers in rural areas are engaged in agriculture either in principal or in subsidiary capacity. Though the share of agriculture in total workforce has declined over the years, the transition has been taking place at a very slow rate. This is particularly slower for rural women workers. Nearly three-fourth of rural women workers are still engaged in agriculture. Although there is very little diversification of rural workforce to non-agriculture, rural- urban centres in search of better livelihood is an increasing phenomenon in India.

By 2050, as per estimations, half of the Indian population will be residing in urban areas. It has been observed that as economies progress and move towards development, the workforce tends to move away from the primary sectors. Management of rural-urban migration will be a crucial factor for ensuring agricultural growth & food security in the future.

Agricultural workforce in India has decreased by around 27.3 per centage points between 1980-81 and 2018-19 but in contrast the total workforce in absolute numbers has shown an increasing trend. Later till 2022-23, the workforce under agriculture increased due to CoVID-19. Indian farmers are convinced with the fact that urban centres are a hub for better education, health & employment avenues. High remuneration & opportunities in other alternative sectors, seasonality of agricultural work are driving forces of reduction in the agricultural workforce. MNREGA, the employment guarantee act which assures employment of 100 days in a financial year is reported to have less tedious & lesser time work compared to the agricultural work. Hence, labourers choose MNREGA work over agricultural work.

The CWMI of NITI Aayog is the first step towards.



Source : PLFS Surveys, MoSPI, GoI

Gender Discrimination

Women constitute 42% of the agriculture labour force in India but own less than 2% of the agriculture land as per recent statistics released by the University of Maryland & National Council of Applied Economic Research. Work done by women in agriculture remains invisible. Gender pay gap & stereotyping of job roles are main issues affecting female agricultural workforce. As the data from NSSO shows the gender gap in daily earnings (measured at current prices) between male and female workers has increased over time. In 2017- 18, male casual workers earn 1.43 times more than female casual workers. In terms of real wages also (measured in 2017-18 prices) there is a persistent gap in the daily earnings between male and female workers.

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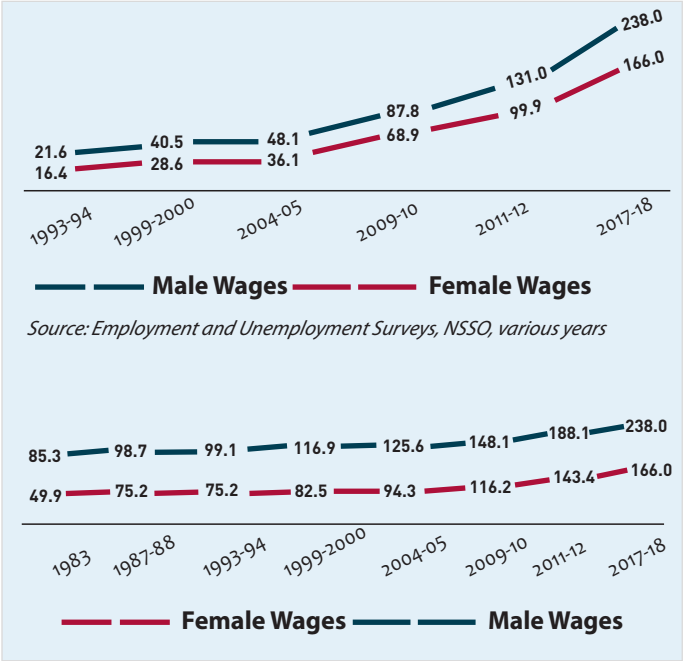
Daily earnings of casual labourers from Agriculture (in rs. per day) (at current prices)



Source: Employment and Unemployment Surveys, NSSO, various years

Gender Sensitisation

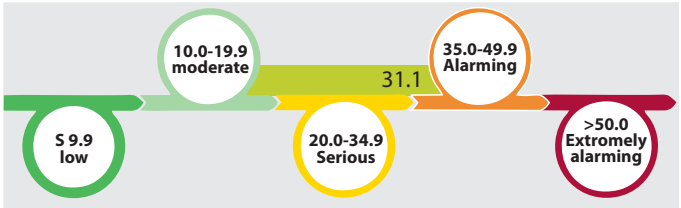
Women farmers are deprived of credit facilities, insurance & other benefits because of lack of land ownership. Bridging this gender gap is essential to catalyse the growth of the agriculture sector. Almost 78% of women farmers face gender discrimination. As per FAO 2011 report, if women get access to the same resources as men, then agricultural productivity of each farmland can be increased by 20-30%.

This can increase the agricultural output of developing countries by 4% which ultimately can fulfil the hunger of 100-150 million people. In Indian agriculture, the roles of women are getting redefined due to the migration of men to urban centres in search of better remuneration. This has resulted in an increase of women workforce in India in recent decades. Women farmers should be acknowledged by empowering them through adequate training & removing biased perceptions of women's roles.

Malnutrition

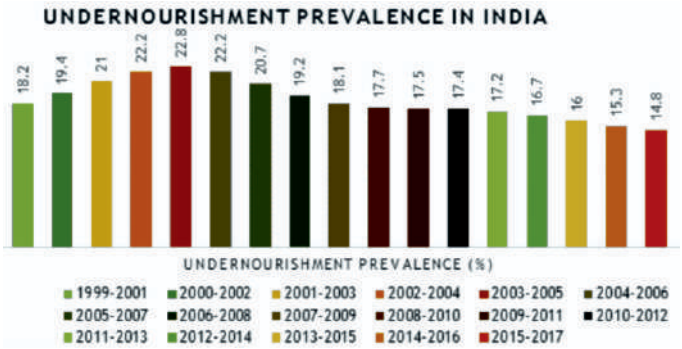
A Silent Epidemic:

Malnutrition is a silent emergency in India that needs to be addressed on priorly. India remains a nutritional weakling with nearly 195 million undernourished people in spite of the economic developments. India is a home to 35%of stunted children and 19.3% of wasted children out of total children in the countyr as per the global nutrition report 2022. Also, India is home to over 1 million overweight children. It ranks 107rd among 119 qualifying countries with an alarming score of 29.1 on Global Hunger Index 2022. The South-East Asian countries are at a serious threat of facing the issue of triple burden, comprising of malnutrition, undernutrition, and micronutrient deficiencies. Hunger is not a social issue but a political issue indeed, which needs to be addressed immediately.



(Source:Global Hunger Index)

Malnutrition is not just due inaccessibility of the food but also because of undiversified diets. 'India's focus needs to shift from food security to nutrition security'- are the words of renowned geneticist M.S Swaminathan. Good public nutrition can be ensured by raising agricultural productivity. Farm production diversification is highly correlated with dietary diversification which can ultimately help in combating malnutrition. Immense capacity building is required to address India's war on malnutrition. Government initiatives like National Food Security Mission, National Nutrition Mission, Integrated Child Development Scheme, Mid-day meal schemes are in progress to ensure food security in India. One of the strategic frameworks of FAO, the Monitoring and Analysing food and agricultural policy (MAFAP) which is implemented in India tends to support the government in modifying its efforts in the agricultural domain, emphasizing more on productivity and small farm holdings. Through the National Institution for Transforming India (NITI Aayog), India is planning to join the MAFAP II for monitoring and Analysis of domestic, agricultural and food policies. The undernourishment in India is at 16% of the population in 2022 as against to the 13% in 2017.

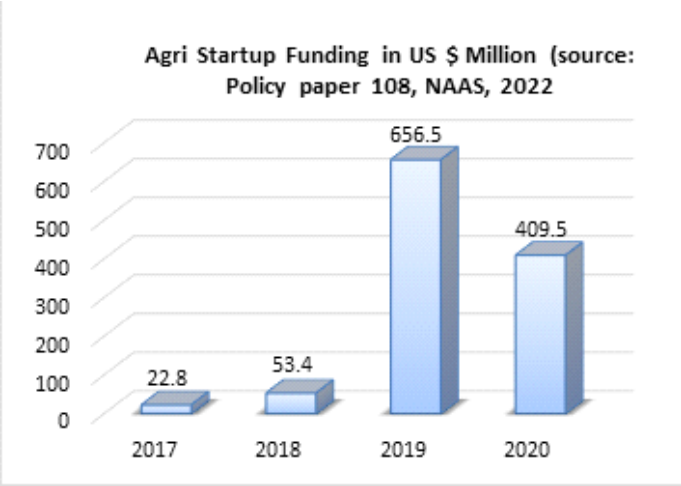


Agricultural Startups

The Indian agricultural sector is plagued by a plethora of challenges which entails the need for innovations in the sector. India is self-sufficient in many commodities & has a significant international presence in production of many commodities but still productivity is comparatively low. As per ICAR estimates the demand for food grains by 2030 will be 345 million tonnes. Along with the challenging factors like increasing population growth, smaller land holding, inadequate infrastructure, etc., the performance pressure on the farms is increasing considerably. It underpins the need for innovations in the agricultural sector. Agri- start-ups which has huge potential for innovation, investment & impact can provide a meaningful solution for this crisis. India is one of the top 5 countries in the number of start-ups in the world. The World Bank 2019 report has ranked India among the top ten improvers for two consecutive years in the ease of doing business.

The government of India is planning to reorient the agribusiness sector by introducing the 'Ease of Doing Agribusiness index'. Among all the recognized agri-startups (Startup India, 2021), currently, there are 1485 agritech startups— 474 for organic agriculture, 1774 for food processing, 48 for horticulture, 130 for animal husbandry and dairying, 22 for fisheries, and 74 have a combination of such activities. About 90% of funding is focused on seed stage & early-stage start-ups is noteworthy. In terms of geographical spread, about 60% of the agri-startups are located mainly in Tier I & II cities in a few states. Karnataka and Maharashtra accounted for half of the total agritech startups in the past five years. Number of start-ups in India is projected to raise year on year with large number of job opportunities.

Major focus areas of the Agri start-ups in India are Supply chain, Infrastructure development, Finance - related solutions, Farm data analytics & Information platforms. Rise in number of Agri – start-ups underpins the need for the human capital with knowledge & skills in the innovation.



Research & Development

Enhancing agricultural productivity in those areas of the country which bypassed the Green Revolution will require new approaches that provide incentives and funding mechanisms that promote the translation of new innovations in plant science into concrete benefits for poor farmers. Through better dialogue, plant breeders and laboratory scientists from both the public and private sectors need to find solutions for the key constraints to crop production, many of which centre around abiotic and biotic stresses.

Genetics and Breeding: The revolution in plant genomics has opened up new perspectives and opportunities for plant breeders who can now apply molecular markers to assess and enhance diversity in their germ-plasm collections, to introgress valuable traits from new sources, and to identify genes that control key traits.

Roadblocks Facing the Public-Sector Learning to think like the Private Sector Technically, GM: For all these issues, there could be no better mentor than the scientists of the private sector who deal with these issues on a routine basis. One way to foster such mentoring would be to engage the interest of the Private Sector Committee for CGIAR, the mission of which is to foster better interactions between private-sector science and that conducted in the CGIAR system.

Micro Factors

Factors and emerging trends relating directly to agriculture within India and which have a direct bearing on the skills and workforce development needs of the industry'.

Digitisation

The need of the hour is of skill enhancements in digital and technological aspects as the employment opportunities in near future will be more skill intensive. The last decade witnessed rise of entrepreneurship in agritech from Artificial Intelligence to Autonomous tractors. Digital literacy in India is merely around 6.5%. Due to extreme climatic distress about 50% of farmer's queries in India are pertaining to weather related information. In addition, Agriculture is an intense databased occupation. Information and Communication Technologies (ICTs) will play a key role in knowledge exchange, targeted recommendations, market integration and access to finance to make agriculture a profitable enterprise and attractive for youth. The provision of precise information regarding soil moisture and nutrient content, climatic variability, timing of agricultural operations of sowing, planting, harvesting will prove beneficial through adequately driven and professionally managed system.

As, 94% of farmers in India depend upon 'fellow farmers' as the preferred source of information, followed by 10% on agro retailers, 4% of TV/Radio and only 3% on agro-extension officers. Audio-Visual aids like Radio & Television reach only 150 million households of India. The rise of internet connectivity and cell phone usage in rural areas has laid a well- equipped platform for dissemination of advance technologies and information to farmers. India had about 700 million active internet users as of FY2022, according to Nielsen's India Internet Report 2023. Of these, rural India accounted for 425 million users and 295 million users in urban areas. Information dissemination through cell-phones will equip them with real time information.

Digital India envisions empowering citizens with e- access to government and related livelihood services. This project has 3 core components - digital infrastructure, digital services and digital literacy.

Mobile phone is the preferred delivery medium under Digital India with focus on m-Governance and m- Services. Public – Private partnerships involving proven ICT led agriculture initiatives will also benefit Indian farmers at large scale. The most trending & sought- after concept 'block chain technology' has potential to resolve the issues persistent in the Indian agriculture.

Block chain will offer transparency due to its decentralized attribute in supply chain management. The Indian government has to probe and acknowledge the significance of it before its full implementation in the agriculture sector and has to de-complex the concept to make it comprehendible to farmers. 'Ika', the digital commodity management platform along with the Coffee Board of India for easing the trading of agricultural commodities and reduce wastage and ensuring good returns to farmers has implemented Block Chain technology for commodity trading while ensuring timely payments to farmers.

Use of Artificial Intelligence

The World has always experienced a wave of scientific evolution which transforms the outlook of the nation's towards development, this time it is Artificial Intelligence that is driving the technological advancements in different sectors. Agriculture being the Primary industry has also caught up in this wind of change. Due to the arising problems of unavailability of labour, population explosion, food security concerns the need of Artificial Intelligence (AI) is indispensable. Indian agriculture domain has recently witnessed the inclusion of drones with AI for crop growth monitoring, predictive agriculture, automation technology for which the agri-machinery segment has attracted FDI equity flow worth 2.45 billion in the past decade sought- after concept 'block chain technology' has potential to resolve the issues persistent in the Indian agriculture.

Farm Mechanisation

Agriculture & allied sector in India has immense significance in the sustainable growth of the economy. The sector has welcomed many technological advancements in the past decades. Stagnant productivity per hectare & shortage of agriculture labour are the upcoming prime bottlenecks in the agriculture sector. Agricultural mechanization is the appropriate answer to these challenges. Effective utilization of farm machinery can help in improving productivity & timely undertaking of farm operations. Proper equipment can increase productivity by 30% & reduce the cost by 20%. The degree of mechanization was slow during the period from the mid-1970's to 2013-14 but gained momentum and reached 2.02 kW/ha by 2016-17 and 3.04 kW/ha in 2022. But mechanization is lower level in India compared to countries like USA, Brazil, China and other advanced countries. Input Survey data for the year 2017 indicate that the machinery usage was the highest in soil preparation (90.7%) followed by harvesting (27.5%), sowing/planting (20.5%), weeding & plant protection (16%), and straw management (6.2%). The farm mechanization market value was Rs. 1023 billion in 2022 is estimated to reach Rs. 1853 billion by 2028. India is the largest tractor market in the world. The sale of tractors & power tillers has shown a growth with CAGR of above 6% during the period from 2005-06 to 2022-23.

The Central Government has launched Sub-mission on Agricultural Mechanization (SMAM) to increase the machinery use among small & marginal farmers. The trending concept of custom hiring which works on a value-driven approach has the potential to increase the mechanization level in India. The custom hiring model or farm machinery banks has a pivotal role in introducing new technology to the farmers. It is an evolving concept that can change mechanization landscape of the country but the lack of knowledge of operation remains an obstacle to this achievement.

Rise in Agricultural Credit

Agriculture Credit is one of the major drivers fostering agricultural production and equitable growth in the country. A large number of institutional agencies like Cooperatives, Scheduled commercial banks, Regional rural banks, Non-banking financial companies NBFCs, etc. are involved in the disbursement of credit to agriculture. Loans have been effective in creating productive assets in the agrarian society as well as their effective utilization. However, the persistence of money lenders is still a matter of concern in the credit sector.

Institutional credit has seen a tremendous increase in past decades. It has increased from Rs.8.45 lakh crore in 2014-2015 to Rs.21.55 lakh crore 2022-23 and target for the year 20025 is 24 lakh crore. About 50% of the agricultural households in India are indebted. But the issue of inequity in disbursement remains a hurdle for the development of agriculture. Several measures are taken by the government to increase the institutional flow to benefit the small & marginal farmers.

The Long-Term Rural Credit Fund by NABARD is the investment credit that catalyses capital formation going a long way in promoting agricultural production and productivity. NABARD is providing refinance facilities to Cooperative Banks and RRBs out of this fund to enable them to provide agriculture term credit at a concessional rate. Similarly, the Self-Help Group- Bank Linkage Model of NABARD supports the innovation leveraging on community structures and existing bank institutions. It gained momentum as a partnership model between SHGs, Banks, and NGOs so as to achieve financial inclusion of the underserved section of the society. Also, there has been a surge in rural credit lending by microfinance institutions. Some of the microfinance institutions are specifically focused on lending credit for a particular segment. There are a number of schemes available that focus on promoting rural entrepreneurship, women empowerment, and improve coverage of crop insurance. Through Pradhan Mantri Jan Dhan Yojna, the financial inclusion of Indian mass to access financial services is being ensured. The scheme is providing benefits like free cover insurance and easy transfer.

Towards Organic India

India is home to nearly 30% of organic growers in the world. As per FiBL report, 2022 on organic agriculture, organic cultivation area in India accounts merely 2.5% of the world with 4th position. The global organic market is growing at a CAGR of 26% much faster than the conventional product market of 10%. Poor policy measures & rising input costs make organic farmers struggle as per the studies conducted by ASSOCHAM & Ernst and young. Fear of decline in production & unavailability of organic inputs in the market is discouraging farmers to switch to organic farming. Productivity on an average dips by 6.7% during first year as per ICAR reports.

The government should support the farmer at the period of transition. Tedious & cumbersome certification systems prevailed as an obstacle for availing better market opportunities by farmers. The central government has launched Paramparagat Krishi Vikas Yojana – free certification programme for organic farmers to address this issue.

The major states in the Indian organic production in quantity are Madhya Pradesh, Rajasthan, Maharashtra, Karnataka and Uttar Pradesh. Sikkim is a promising state in the export scenario of organic produce and its exports are globally perceived to be of premium quality. The organic industry is anticipating to procure 55% of its produce in the near future. The country has exported 312.8 million MT of organic produce in the year 2022-23. The major importers of Indian organic produce are European Union, Canada, UK, Switzerland, Turkey, Australia, Israel, South Korea, Japan etc. The major produce include cereals, oil seeds, processed food, sugar, tea, coffee, ect. The budget 2023-24 supporting to switch 10 million farmers to natural farming.

Agricultural Infrastructure

Food wastage issue remains as a hitch in India's effort to combat hunger & poverty. As per the Food and Agriculture Organisation (FAO 2011) report, 45% of fruits & vegetable losses are due to inadequate infrastructure. Food supply chain losses are still a very less addressed issue in India. Agriculture infrastructure like roads, markets, cold storage structures, etc. has a significant impact on raising farm productivity & reducing farming costs. It helps in accelerating the agricultural development of the country. Agricultural infrastructure provides services that facilitate production, procurement, processing, preservation & trade. Investments in agricultural infrastructure help in lowering transportation costs & increases the farmer's access to markets. A major portion of agriculture produce is lost before reaching the final consumers because of the poor transport and inadequate storage facilities as per a World Bank study. Inadequate road connectivity limits the market access to the farmers and acts as a hurdle in the dissemination of technologies. On average, farmers need to travel 12 km to reach the nearest mandi and more than 50 km in the North- Eastern regions.

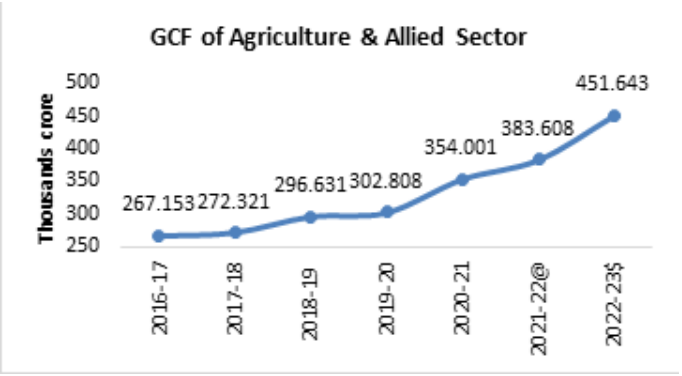
The government has launched the Golden quadrilateral project and Pradhan Mantri Gram Sadak Yojana (PMGSY) to improve road connectivity in a view to reducing the agricultural wastage.

The agricultural supply chain in India is inefficient because of the heavy losses of commodities. 20% of the food grain produced annually are lost due to poor storage. According to Knight & Frank report, the total warehousing requirement is expected to grow at 9% CAGR from 2014 to 2022. Also, the lack of proper knowledge about the maintenance of the premises acts as a drawback for the improvement of the supply chain.

In India, 10-11% of fruits & vegetables produce only uses cold storage. Annual loss due to inadequate storage facility stood at 25% of the produce. Adequate cold chain infrastructure is the immediate need of the decade. The cold chain industry is still at a nascent stage in India. The high share of single commodity storage, high initial investment, lack of awareness of handling perishable produce are acting as a snag to the development of cold chain infrastructure. But with proper policy backing the cold chain infrastructure is the next big wave in the country which is going to play a pivotal role in reducing food wastage.

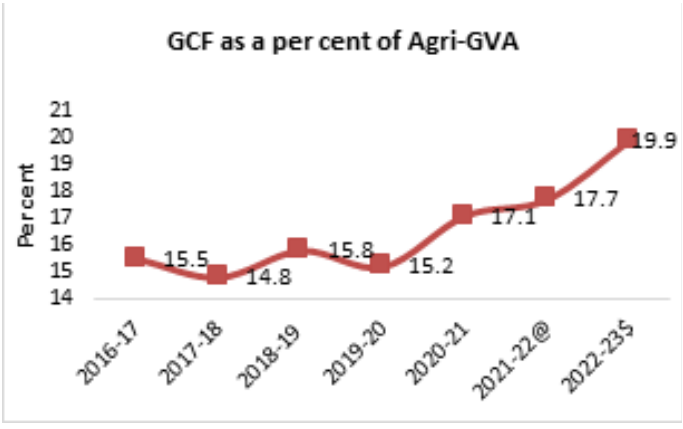
Capital Formation In Agriculture

Capital formation in agriculture is important for improving productivity, raising farm incomes, and revitalising agricultural growth. As per United Nations System of National Accounts (UNSNA), Gross Capital Formation (GCF) in Agriculture consists of the net acquisition of machinery and equipment, dwellings, other buildings and structures, cultivated assets (such as livestock, trees), intangible assets, valuables, and net changes in inventories. GCF minus changes in inventories (stocks) and valuables. There has been a negative annual growth of capital formation in agriculture between 2011- 12 and 2017-18 when measured at constant prices (base 2011-12). However, this negative growth is mainly due to a fall in the private capital formation as the public capital formation during this period and later it has increased slightly per annum.



@Second Revised Estimates, $ First Revised Estimate

Share of the public sector in GCF has increased from 15.5 percent in 2016-17 to nearly 19.9 percent in 2022-23. But, a rising public investment has not induced a faster growth in private investment. Analysts have ascribed various reasons for this falling private investment. Most important among them is a decline in return from the investment, fragmentation of holdings, and falling farm profitability. Also important to notice that the ratio of GCF to the GVA of agriculture increased continuously during the period under consideration.

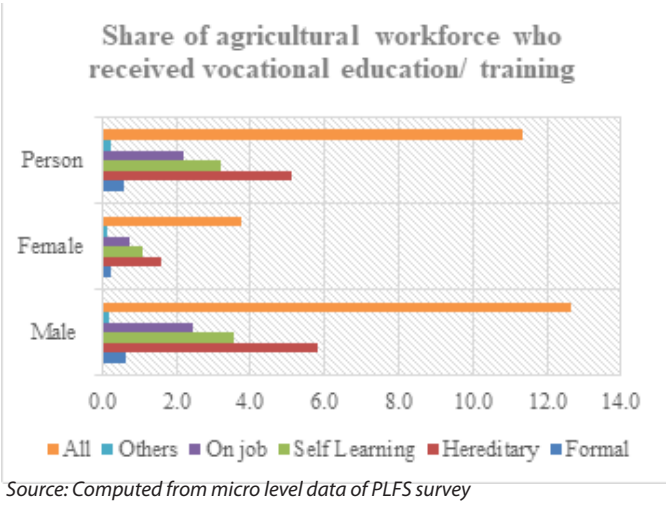


Source: Economic survey 2023

Skill Development in the Agriculture Sector

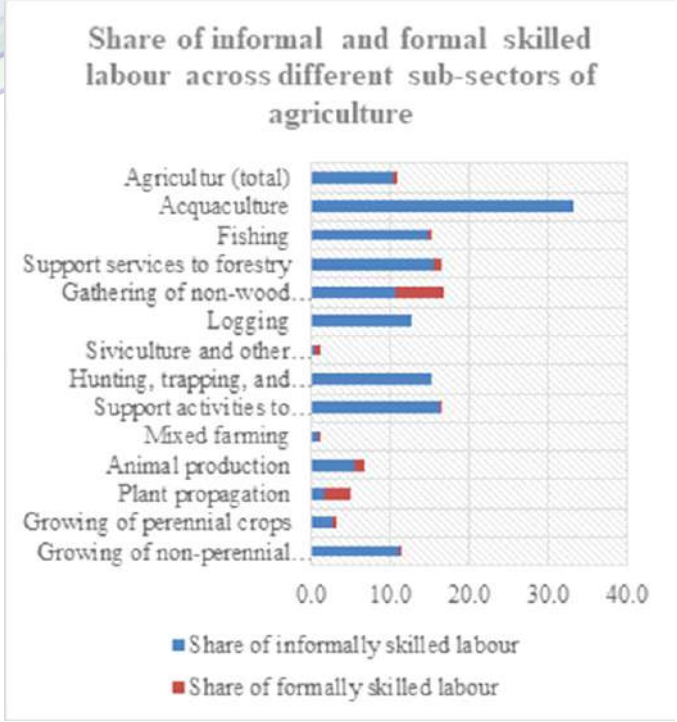
Skill development and training of farmers is important for a number of reasons- the adoption of new technology, improving efficiency, building entrepreneurial ability are the most prominent among them. However, as per the latest data thrown out by the National Statistical Office shows the majority of the agricultural workforce in India have not accessed any vocational education or training in agriculture- either formal or informal (through hereditary, learning on the job or other informal means).

The PLFS survey, 2021-22 also indicates that only 3.3% of the total workforce has technical education either Degree or Diploma and in rest of the workforce, formally skilled persons were only 3.4% and around 16.1 % were trained in an informal manner i.e hereditary, self-learning and learning while doing job. About 0.6 % total workforce received vocational/ technical training in agriculture and allied sectors. There exists a huge gender gap in access to VET- only 3.8 % of female workers received VET as compared to 12.4 % male workers. Also important to note that the percentage of agricultural workforce who received formal VET is negligible- only 0.6 % male and 0.2 % female. This clearly gives an indication of the gigantic task ahead for skilling of the workforce engaged in agriculture.



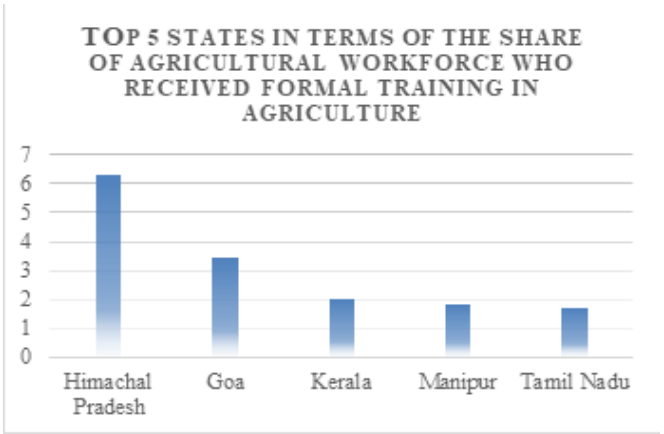
Source: Computed from micro level data of PLFS survey

Next figure shows distribution agricultural workers across different sectors by access to formal and nonformal vocational education and training. We have considered upto 3 digit of National Industrial Classification (NIC 2008). It can be seen that support services to forestry (16.7%), fishing (15.4%) and acquaculture (33.2%), support activities to agriculture and post-harvest activities (16.5%), and gathering non- timber forest produce (NTFP) have highest share of skilled labour in their labour force. However, almost all these skilled workers, barring an insignificant proportion received only nonformal VET. There is dearth of formally skilled workers in all subsectors of agriculture.



Source: Computed from micro level data of PLFS survey

If we look at the State level figures, we find that Himachal Pradesh has the highest proportion of the formally trained agricultural workforce (around 6 %). The other 4 States which have highest share of skilled workforce are Goa (3.5 %), Kerala (2 %), Manipur (1.8 %), and Tamil Nadu (1.7 percent). Interesting to note that all these States have a higher proportion of their workforce literate as compared to all other States. Also, these States have a larger share of their agricultural land under horticulture and cash crops.



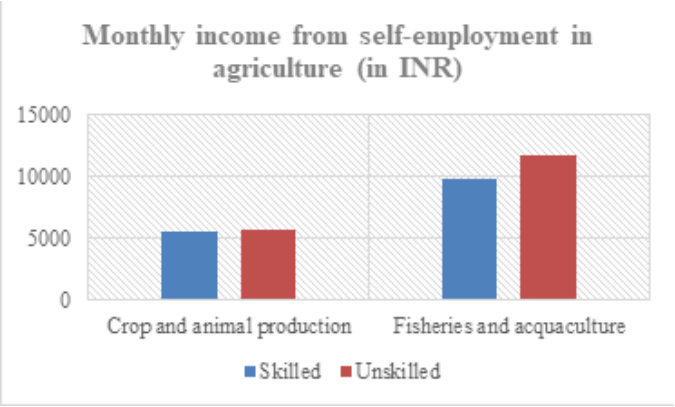
Source: Computed from micro level data of PLFS survey

Next, we look at the distribution of skilled workforce by duration of training. It can be seen that the majority of workers (28 %) in agriculture have undergone training of duration between 18 months and 24 months. The second highest categories are 6-12 months and 24 months or more (both 22% each). As against these, very few proportions of farmers have undergone training of lesser than 6 months or less than 3 months duration.

If we want to improve the coverage of skill development training programmes among farmers, more short-duration training programmes and bridge courses customised to the requirement of the farmers need to be devised and promoted

Source: Computed from micro level data of PLFS

There is little wage premium for skilled labour is agriculture. The skilled workers self-employed in crop and animal production who has received vocational education either formal or informal earns Rs. 284 more per month than others. The earning difference between skilled and unskilled workers is more in case of fisheries and aquaculture. A skilled self-employed workers is fisheries and aquaculture earns Rs. 1856 more per month than unskilled workers. Thus, although there is a wage premium for skilled workers this not very high.



Source: Computed from micro level data of PLFS

Skilling in agricultural trades should get a lot more attention in the next phase of skill development schemes with wider coverage and greater allocation. We also have to keep in mind, that the working-age population is going to expand in the next few decades and with almost jobless growth of high-end services and organised manufacturing, agriculture is the last resort for respectful employment of the growing population.

Fragmentation

Fragmentation of agricultural land is a widespread menace that has a huge impact on the farmers' decision & farm performance. The number of farms in India has increased from 71 million in 1970-71 to 145 million in 2015-16. The average farm size has reduced considerably. More than 70% of the cultivated farmland is less than 1 ha. About 86% of the farmland is owned by small & marginal farmers. The national average landholding size has reduced from 2.28 hectares to 1.08 hectares. Population outburst & Succession planning are the major factors which have led to the continuous subdivision of farmland.

Fragmentation has a significant negative effect on the farm profit. It has led to the rise of more obstacles for farm performance like difficulty in machinery use, inability to adopt modern technologies, a decline in soil fertility (due to continuous mono-cropping) and trouble in availing farm credit. Scattered agricultural production increases the transportation cost & reduces the producer's share in consumer rupee. It has also increased the involvement of family labour rather than the skilled workforce. The central government has launched PM Kissan Samman Nidhi which promises Rs 6000 per year per family with land size less than 2ha. The complexity of the identification of beneficiaries and nonbeneficiaries without an authentic database is a hurdle for the effective implementation of the farm income support scheme. Fragmentation is a challenge for sustainable agricultural development.

Policy Drives

With advancements in technological measures and land reforms, the government looks forward to meeting the need for population and development. The recent policies of Make in India and Skill India look forward to up-skill the Indian workforce through training, apprenticeship, and Recognition of Prior Learning programmes.

Minimum Support Price Scheme: Minimum Support Prices (MSP) for major crops is declared by the Government of India at the beginning of each crop season on the recommendations of Commission of Agricultural Costs and Prices (CACP). The objective of Minimum Support Prices is to ensure a remunerative price for the farmers and preventing any drastic fall in prices. It is also a guaranteed price or assurance to the farmers that at the end of harvesting season the procurement price at which government procurement agencies purchase grains from farmers would be at least greater than or equal to MSP. MSP is calculated based on the cost of cultivation data.

PM-AASHA: Pradhan Mantri Aay Sanrakshan Abhiyaan (PM-AASHA) was introduced with the objectives of ensuring remunerative prices for the farmers. The three components of the scheme are the Price Support Scheme (PPPS). Under PSS procurement of pulses, oilseeds and copra will be done by Central Nodal Agencies with the proactive role of State Government. In addition to public procurement agencies, private players also allowed procurement on a pilot basis under PPPS. There is provision for payment of the difference between market price and notified Minimum Support Price to the farmers who sell it below MSP.

Paramparagat Krishi Vikas Yojna

The government has launched Paramparagat Krishi Vikas Yojana in order to address the critical importance of soil and water for improving agricultural production. The government would support and improve organic farming practices prevalent in India. Following the cluster approach mode of farming, at least 50 farmers would form a group having 50 acres of land to implement organic farming. The government aims to cover 10,000 clusters and five lakh hectares of arable land under organic farming within three years.

e-NAM: National Agricultural Market is a pan-India electronic trading portal launched by the Ministry of Agriculture & Farmers' Welfare, Govt of India, to facilitate farmers, traders, buyers, exporters and processors with a common platform for trading commodities.

Pradhan Mantri Fasal Beema Yojna: PMFBY was launched in 2016 to provide insurance coverage and financial support to the farmers in the event of failure of any kind of notified crops as a result of natural calamities, pests, and diseases. The premium rates to be paid by farmers are very low and the balance premium will be paid by the Government. Under this scheme, there is a uniform premium of only 2% to be paid by farmers for all Kharif crops and 1.5% for all Rabi crops. In the case of annual commercial and horticultural crops, the premium to be paid by farmers will be only 5%.

Soil Health Card Scheme: To promote the soil health status, the government issued soil cards to farmers which carry crop-wise recommendations of nutrients and fertilizers required for the individual farms to help farmers to improve productivity through judicious use of inputs.

Agriculture Export Policy 2018: Government of India targets to double the value of exports to $60 billion by 2022. A monitoring framework was established with commerce as the nodal department to monitor the export-import market. This policy will be beneficial in diversifying the export basket & boost exports of agricultural products. It is a step taken by the Government of India in a vision of Doubling Farmer's Income.

E-Pashuhaat: It is a web portal launched by the Ministry of Agriculture and Farmers Welfare, Government of India, under the Department of Animal Husbandry, Dairying and Fisheries (DADF) to boost dairy productivity in India by arranging online livestock market. The portal allows farmers and entrepreneurs to find information about bovine animals, buy or sell livestock, frozen semen and embryos.

Rashtriya Gokul Mission: With the aim to conserve and develop indigenous breeds in a scientific and holistic manner. This undertakes breed improvement programme for indigenous cattle breeds so as to improve the genetic makeup and increase the stock. It also aims to enhance milk production and productivity of indigenous bovines.

National Livestock Mission: It is designed to cover all the activities required to ensure quantitative and qualitative improvement in livestock production systems and capacity building of all stakeholders. The Mission will cover everything germane to the improvement of livestock productivity and support projects and initiatives required for that purpose. This Mission is formulated with the objective of sustainable development of the livestock sector, focusing on improving the availability of quality feed and fodder.

Dairy Entrepreneurship Development Scheme: This aims to promote setting up of modern dairy farms for the production of clean milk and to encourage heifer calf rearing, thereby conserving good breeding stock. It looks forward to bring structural changes in the unorganized sector so that the initial processing of milk can be taken up at the village level itself. The objective of the scheme is to upgrade the quality of dairy products including milk and generate self-employment.

National Dairy Plan: NDP is a scientifically planned multi-state initiative with the objectives of increasing the productivity of milch animals and thereby increasing milk production to meet the rapidly growing demand for milk. NDP helps to provide rural milk producers with greater access to the organized milk-processing sector.

National Scheme on Welfare of Fishermen: Its objective is to provide financial assistance to fishermen for construction of house, community hall for recreation and common working place and installation of tube-wells for drinking water and assistance during lean period through saving cum relief component.

100% FDI: In order to meet the food grain requirements of the country, agricultural productivity and its growth needs to be sustained and further improved. The government too is determined to rejuvenate the agriculture sector. India needs Foreign Capital that can boost the agricultural sector in terms of productivity and capital formation. Moreover, foreign capital with the latest technology and research would be an added advantage for the agricultural sector. FDI up to 100% is permitted under the automatic route in activities such as the development of seeds, animal husbandry, pisciculture, cultivation of vegetables and mushrooms, etc. under controlled conditions and services related to agro and allied sectors. Recently, the government has been active in investing in agricultural infrastructures such as irrigational facilities, mechanized farming, and warehousing. The growing use of genetically modified crops will also improve the sector's contribution to GDP.

Rain-fed areas development program: Implemented under the flagship scheme of Rashtriya Krishi Vikas Yojana (RKVY), the program aims to improve the livelihood of small and marginal farmers by offering a complete package of practices. The program focuses on developing a sustainable approach to increase the productivity of farms by reducing the risk of climatic disruption. Adoption of modern on-farm technologies and practices will generate employment opportunities.

Agricultural Contingency Plans: Launched by Central Institute for Dryland Agriculture, the Agricultural Contingency Plans are specified technical plans designed for districts, to deal with various climatic anomalies. The program focuses on mitigating and averting the climatic deviations on different agricultural segments such as livestock, fisheries, dairy, horticulture, and poultry. These plans are uploaded on the farmer portal of the Ministry of Agriculture and farmer's welfare for 614 districts.

Market Factors

The attraction of New Generation Workers

According to the Census 2011 report, every day 2000 farmers are giving up farming. The younger generation is hardly interested in agriculture. Many factors- falling income, physical hardship, increasing risks, and image of an outmoded occupation associated with agriculture make this sector unattractive to the young & educated workforce. Migration to urban centres is also increasing rapidly putting disproportionate pressure on urban infrastructure. Almost 40% of the population engaged in agriculture is illiterate and needs skilling in scientific and modern cultivation practices. The workforce in agriculture in 2021-22 is 45.5% of total workforce (216 Million) as per the PLFS survey. As time passes, labour force reduces in the agriculture, mechaniation increases and most of the jobs are being skill based to keep in line with technological improvements. With supportive infrastructure and appropriate policies, skill development of the agricultural workforce can be achieved.

Governments should formulate the necessary strategies to address the challenges faced by youth in agriculture. Attracting & Retaining Youth in Agriculture (ARYA) aims to attract the youth towards agriculture such that the workforce employed in agriculture is equally skilled and updated with the technological advancements. Blending rural youth with technology & inspiring them to be Agripreneurs can enable them to earn a decent livelihood in agriculture. There is a need for

- Promoting the contemporary business, science, and innovation centered professions in agriculture and allied activities.
- Building an effective, grassroots level, knowledge-based skills ecosystem.
- Growing and advancing the assortment of pathways into the business.
- Identifying and advancing industry achievers, specialists, and middle people.

Diffusion of New Research Findings, Innovative Practice & Technologies

The Indian agriculture sector will turn into more knowledge & skill-intensive in the coming decades. This calls for a significant step up in the public expenditure on agricultural research. The total research & development expenditure in agriculture is stagnant for the last 2 decades & low compared to countries like the US, China, Israel, etc.

Institutional research in India started way back in the 1880s with the establishment of the department of agriculture in each of the provinces. All the research centres came under ICAR after India gained independence. Correspondingly the State agricultural universities (SAUs) took the responsibility of research & education at the state level. Today, 27500 eminent scientists & 1 lakh supporting staffs are part of the nation's agriculture research system.

The benefit of new technology or research fully realized only when it is efficiently diffused. Dissemination, adoption & adaptation of new knowledge or research finding at grass root level & equipping people with the new skill sets derived from the latest research or discovery is a challenge in India. Extension services/Training helps in bridging the gap between research centres & farmers/trainees and makes farmers familiar with the new innovative technologies.

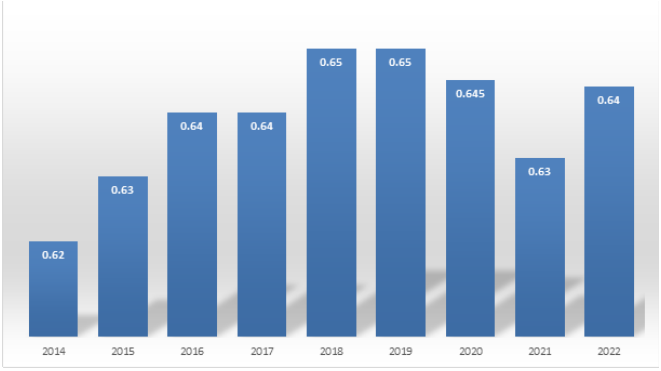
Adoption of Higher-level Skills Within the Existing Workforce

The agriculture sector is witnessing new & evolving changes every day. As the industry is getting transformed with new & advanced technologies, it is the prime need of employers & employees to evolve the skills to keep pace with change. If the evolution of skills is not in momentum with the change, then a massive gap develops between the demand & supply of the skills in the market. Upskilling of the existing workers is the need of the era. Employers are the ones who are supposed to drive this initiative. The upskilling/ reskilling of employees on higher skills provides immense opportunities for employers to retain their existing workforce. The cost of replacing an employee is also much higher. The ultimate challenge here is the identification of future needs of the sector. Effective & need identified training can only build effective skills in this modern century. Appropriation of higher aptitude levels over the workforce remains the absolute most basic methodology in addressing the difficulties which lie ahead and will include:

- Diffusing new and emerging abilities to the workforce through focused, constructing squares way to deal with the conveyance.
- Increasing language, literacy, and numerical proficiency and core abilities of the workforce to enable them for highly skilled jobs.

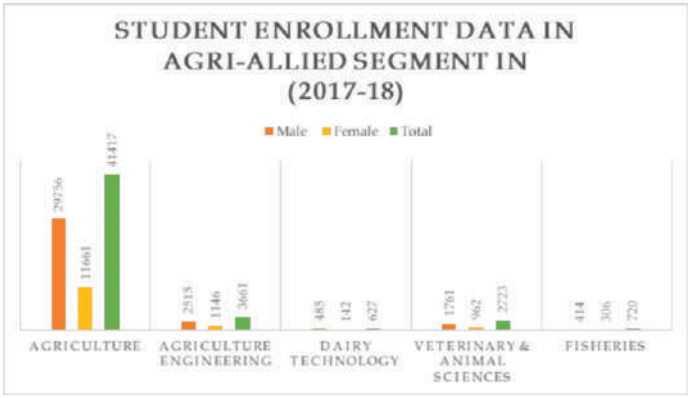
Retention & Skills Utilisation of Existing Workers

As an effective tool to underpin workforce retention, better utilisation of existing skills and re-engagement of workers in the learning process, 'Recognition of prior learning' must be elevated. Recognition to prior learning is an initiative to acknowledge the skills learned through informal learning or through experience as formal levels of education. This scheme recognises the learning irrespective of its medium of achievement. The HDI index for India in 2022 is 0.64.



As per the World Bank report, only a 2.3% workforce in India received formal training. When compared to other countries like South Korea (96%), Japan (80%), Germany (75%), UK (68%) & China (40%), this percent of formally trained workforce in India is meager (Source- Indiastat.com). By 2022, there will be a demand of 109 million skilled workers as per the skill gap analysis was done by the government of India. Improving access to formal skills by recognition can be a transformative lever to the agriculture sector. It encourages existing workers by validating their learning acquired through informal settings. Also, it can bring many indigenous technical knowledge and skills to the forefront. To transit India to a high skills equilibrium, it is crucial to exponentially increase the demand for skilling. A concerted focus on the recognition of informal learning can be a first step in achieving this objective.

Retention & Skills Utilisation of Existing Workers



Source – Indiastat.com

SECTION-2
Identified Workforce Development Needs

Section 2 - Identified Workforce Development Needs

Agriculture Crop Production

Agriculture & allied sectors being the largest source of livelihood in India, supports 70% of its rural households with 82% of farmers being small and marginal. India's food grain production is showcasing an increasing trend. The food grain production was at record high of 329.6 million tonnes in 2022-23. India is the largest producer, consumer & importer of pulses in the world. Although, India is self-sufficient in grain production, the production is resource intensive, cereal centric and regionally biased. Total production of Rice and Wheat during 2022-23 is estimated at record 136.7 and 112.9 million tonnes, respectively according to advance estimates. This segment consists of Job roles related to cultivation of field crops, Organic farming & its pest and nutrient management.

Challenges

- Raising Agriculture as first destination for Job seekers
- Skilling of Casual, Contract & Seasonal workers and Multi-skilling to sustain full time employment
- Making cultivators adaptive to the new technologies
- Accurate understanding of current labour & skill trends in Agriculture
- Bringing change in the mind-set of people to adapt new, profitable cultivation practices

Emerging Skill Needs

- Skills required by organic farmers to cope up the conversion period losses
- Drought/Flood preparedness & mitigation
- Supply Chain Management & Logistics
- Integrated Farming Systems
- Integrated Pest & Nutrient Management
- Zero budget national farming & Organic farming
- Permaculture
- Good communication skills in interacting with multiple stakeholders

Production Horticulture

Production horticulture is a diverse industry involving growing & harvesting of fruits and vegetables. It includes bulb, tuber, root, green and other vegetable production, spices production, herb growing, berry fruit growing, nuts, citrus growing, sun-drying fruit & grapes and vineyard operation. Production horticulture business produces fresh & dried fruits & vegetables for local markets, processing and exporting. The vast production base offers India tremendous opportunities for export. Horticulture accounts for 25.06% of India's agriculture value of output in constant prices from 13.1% of gross cropped area. India witnessed a record production of horticulture crops during 2022-23. Horticulture production in 2022-23 was 355.48 million tones which is 2.39% higher than the previous year & about 7% higher than the average of previous 5 years. Production of fruits, vegetables, spices and flowers and plantation crops recorded an increase of more than 10% growth rate in last 5 years. However, medicinal and aromatic plants recorded still higher growth. Horticulture production exceeded the grain production in India.

India stands first in production of Banana, Mango, Citrus fruits, Okra, Ginger & Cardamom. Also, India is the leading producer of plantation crops & second leading producer of fruits & vegetables. Although India's share in global market is nearly 1%, the demand for horticulture produce from India is showcasing an increasing trend. During 2022-23, India exported fruits and vegetables worth Rs. 13185.29 crores, processed fruits and vegetables worth Rs. 18090.81 crore, floriculture worth Rs. 1534.94 and seeds worth Rs. 944.41 crores and total horticulture produce worth of Rs. 33755 crore. The use & awareness about medicinal plants in herbal medicine products & supplements has increased in India. This is underpinned by the emergence of large sized companies like Patanjali in the trade of herbal medicines.

Challenges

- Dispelling horticulture sector's outdated image among the workforce.
- Developing clear career pathways within the industry
- Precise understanding of the demand and supply
- Highly fragmented Marketing Supply chain and value chain
- Skilling & upskilling about value chain in farm gate & at the wholesale level
- Evolving Job roles with high technical skills
- Lack of knowledge about temperature-sensitive products & improper handling.

Emerging Skill Needs

- Diversification to high-value crops.
- Advanced crop management & Precision horticulture
- Protected production with technologies like hydroponics, Aquaponics, Aeroponics, etc.
- Skills & Market knowledge for exporting products to emerging markets & global logistics
- Efficient handling of post-harvest infrastructure & curbing of post-harvest losses
- Pollination management for horticultural crops
- Conventional & modern breeding approaches for quality improvement.

Amenity Horticulture & Landscaping

Amenity horticulture, the sector which has gained traction in recent years is also described as 'gardening & landscaping'/'ornamental horticulture' or 'recreational horticulture'. Amenity horticulture in this era of globalization has found its way to cross industrial pathways. It encapsulates segments like arboriculture, landscaping, parks & gardens, turf management, nursery management, interior landscaping & floriculture.

Amenity horticulture has a crucial role to enact in the future management of the environment. Landscaping is a field where architecture, art & horticulture is combined to fulfil the aesthetic needs of human. Urbanization is increasing at a fast pace to accommodate the growing population. This change in the economy has evoked the need for open space, parks, gardens for relaxation, recreation, peace of mind & unpolluted air which ultimately led to bio-aesthetic planning. Amenity horticulture which was earlier considered as an art & science now emerged as a huge industry. This multi- faceted industry is generating huge employment opportunities and simultaneously promoting activities that would improve the environment.

Challenges

- Promoting the image of the industry as high valued Industry
- Promoting Amenity horticulture as a career choice
- Identifying the aspect of industry where skills are required
- Developing career pathways
- Gaining a deep understanding of consumer preferences.
- Adoption of new technologies across the workforce
- Building high performing workplaces & emerging as employers of choice

Emerging Skill Needs

- Flower & Foliage plant arrangement
- Turfing & Lawn management
- Horticultural Therapy
- Creation of Terrariums, Bottle gardens, Vertical gardens & Green buildings
- Bonsai cultivations & Aqua-scaping
- Skills to identify the suitable foliage, flowering plants, creepers, etc. to deliver the best landscape architecture.
- Natural resource management – Bush regeneration,
- Sustainable management of land, water, and vegetation.
- Post-harvest handling of flowers & foliage for decorations/arrangements
- Meeting organic requirements
- Development of wildlife garden & grounds

Post Harvest Supply Chain Management

Large losses in the agriculture sector are incurred between farm to fork, i.e. during post-harvest supply chain management. When the pressure is building on the resources, the losses during the supply chain has a heavy impact on the economy. Hence it is a necessity to increase the handling efficiency and minimize post-harvest losses. India is the second leading producer of fruits & vegetables but still there exists a gap between the per capita demand & supply due to enormous post-harvest losses at the time of storage and handling due to inappropriate bagging, lack of temperature-controlled vehicles, unavailability of cold chain facilities, etc. Approximately 18% of fruits & vegetables get wasted in the country. Supply chain management plays a crucial role in keeping business costs minimum & profitability as high as possible. India can conquer the global food trade if only it has an agile, adaptive, responsive & efficient supply chain. Demand estimation & technology applications such as cold chain logistics supply chains, Product tracking, tracing, etc. are lacking in the supply chains of India. Now, the cold chain industry is an emerging & fast-growing business sector in India. It can be next big wave provided continued government support & improvement in present physical infrastructure & technology is achieved.

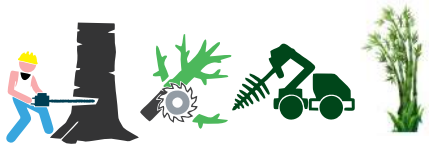
Challenges

- Lack of number of vocational & training institutes focused on cold chain logistics
- Upskilling the existing workforce to adapt to the modern technologies
- Meeting quarantine measures specified for the export products
- Building environmentally sustainable production Systems
- Better management of crop residue, primary processing by-products and wastes in eco-friendly and economically rewarding model

Emerging Skill Needs

- Modernisation of existing stores along with supply chain
- Better & more sophisticated machinery & equipment
- Multipurpose cold storages rather than conventional single commodity storage
- Controlled atmosphere cold storages
- Post-harvest management including Modern pack houses & packaging technology and Ripening facilities
- Farm gate or source point cold storage
- Integrated cargo complexes at airports
- Logistics to supplement cold chain
- By-product management skills

Forestry / Agroforestry



India is ecologically blessed with an abundance of wild flora & fauna. The total green footprint of India is 802088 sq.km which is almost 24.62% geographical area of the country. India is showing an increasing trend in forest cover whereas the global trend is decreasing. The Indian state of forest report recorded a 1% rise in the overall forest & tree cover in India between 2015 & 2022 despite the resource pressures. Green footprint in the northeast region shrunken by 630 sq.km. India ranks 10th in the world with forest cover accounting 2.4% of world surface area & sustaining the needs of 17% of human and 18% of livestock population. The Lakshadweep, Mizoram and Andaman & Nicobar Islands are estimated to have the highest percentage of forest cover with respect to the geographical area in India. An increasing trend of forest cover is contributed by various government policies like Green India Mission, National Agroforestry Policy, Joint Forest management, etc. More than 275 million Indians, i.e. a majority of the nation's tribal, women & marginal farmers depend on non-timber forest produce for income.

Challenges

- Equipping employees & employers with management skills & change management expertise.
- Attracting the skilled workforce to the sector
- Inadequate and diminishing forest cover
- Evolving job roles with newly adopted technologies
- Skilling of tribals and local people
- Highly unorganized sector

Emerging Skill Needs

- Forest parks
- Commercial, Social & Urban forestry
- Silviculture
- Good forestry practices
- Forest health management & conservation
- Forest fires mitigation and management training

Soil Health Management

The green revolution marked the transition from traditional agriculture to the current system with a higher application of modern biological- chemical inputs. The increasing pressure on limited agricultural land to feed a growing population has resulted in overuse of chemical fertilisers, excessive tillage, jettisoning of age-old organic soil revival practices and lack of appropriate crop rotation. India ranks 3rd in the world in fertiliser production but has a 2nd position in consumption. Overuse of chemical fertilisers and often in a distorted ratio of N:P:K has led to the degradation of soil fertility causing a deterioration in its productive capacity. Apart from this, natural factors like floods, volcanoes, earthquakes & human-induced factors like deforestation, ill-management of industrial waste, overgrazing of cattle and urban expansion have led to a reduction in soil fertility. Farmers believe that there is a perfect correlation between high fertiliser usage and more output. In the long term, more fertilisers are detrimental to the productivity of the land. Hence, soil health must be preserved and necessary nutrients replenished as it is crucial for achieving long term higher productivity. Meeting growing food grain needs & nurturing soil health should be of equal concern. Judicious use of agro-chemicals & attaining a balance between organic & chemical products are critical to India's food sufficiency and sustainable farming goals.

Challenges

- Soil conservation and replenishment of vital soil nutrients
- Skilling & Upskilling employees regarding optimum use of fertilizers
- Changing the priority of population to sustainable practice
- Upgradation of soil database
- Land degradation
- Fall in productivity due to excessive use of fertilizers

Emerging Skill Needs

- Soil solarisation & fumigation
- Zero tillage practices
- Integrated & Site specific nutrient management
- Carbon sequestration
- Mulching & crop residue utilisation
- Soil health consultancy
- Biofertilizer and VAM-mycorrhiza technician
- In-situ management of farm waste

Seed Industry Segment

The most basic & critical input for sustainable agriculture is the seed. In India, a country where agriculture is a dominant occupation that has abundant opportunities for the seed market. The availability & quality of seed is a big concern in the agriculture sector to obtain a productive harvest The Indian seed market reached a value of US $ 6.3 billion in 2022 & is estimated to have a CAGR of around 12.4% during 2023-28. India is the fifth largest seed market across the world accounting 4.4 % of global seed market. India is almost self-sufficient in flower, fruits, vegetables & field crops seeds.

Challenges

- Necessity of technical knowledge in the seed industry
- Stringent laws & policies prevailing in the sector
- High cost of production of advanced seeds
- Problems linked with contract farming and less skilled farmworkers
- Difficult to understand IPR laws
- Linking skill development with industry licensing and compliance requirements.

Emerging Skill Needs

- Germplasm conservation
- Genetic engineering
- Hybridization
- Quarantine measures & IPDM
- Transgenic crops
- Traceability with blockchain technology
- Selection of mother plants and application of various grafting methods to produce quality disease free planting material with better nursery management
- Tissue culture techniques for production of planting material

Dairy Segment

India is world's largest milk producer & consumer accounting for 24.64% of world's total milk production in 2023. India milk production stood at 230.58 million metric tonnes in 2022-23 with a growth rate of 5% in last 5 years. About 46% is consumed locally, and in the rest two third is accessed by co-operatives & private diaries, one third is sold in unorganized market. India has transformed from a country of acute milk shortage to world's leading producer because of the government initiative 'Operation Flood'. Major source of nutritious food & only acceptable source of animal protein to a large portion of Indians are dairy products. Dairying has a crucial role in alleviating the poverty & unemployment in the rural areas. According to Managing Director of GCMMF, dairy industry is expected to emerge as the largest employment generator in a decade overtaking the IT sector. India exported 67573 MT of dairy products worth Rs.2269.85 Cr in 2022-23 & contributes to less than 1% of world exports.

Challenges

- Distribution through unorganized sectors
- Scattered and small holder nature of production
- Low productivity of diary animals
- Maintaining hygiene standards & preventing Adulteration
- Full traceability across the supply chain
- Indian dairy products are not competitive in global Markets
- Strengthen village milk collection, including milk weighing, testing, collection, and cooling.
- Rising consumer expectations of food quality and Safety

Emerging Skill Needs

- Cold chain management
- Quality assurance at farm level and across value chain
- Genetics & Breeding including calf rearing
- Mechanization in dairy farming including Automated milking parlours
- Organic dairying
- Trending A2 milk & Camel milk
- Expanding dairy based FMCG companies
- Modernised cattle farm management

Poultry Segment

Over the last decade, India has emerged as one of the fast-growing poultry producer globally & currently stands 4th in ranking for chicken production & 3rd for egg production. The domestic per capita consumption is still lowest in the world. The backyard poultry industry consists of broiler meat & egg. In 2022, the total broiler market size stood at Rs 1238 billion indicating a growth of 8% in volume & total egg production market size stood at Rs.667 billion indicating a growth of 5%. As per ICAR's estimates the per capita meat consumption is 3.6 kg p.a & per capita egg consumption is 81 eggs p.a. As India's consumer preference is for freshly cut broilers, 90% of the broiler sales is done at traditional retail outlets making India as a live bird market. By 2050, the population of the world will raise to 9 billion, where achieving nutritional security will be under crisis. Poultry sector can play a vital role in combating with the crisis. Poultry production & consumption in India is expected to grow in upcoming years due to various factors like shift in food habits, Urbanization, Increasing awareness of balanced nutrition etc.

Challenges

- Fluctuation in market price due to disease epidemics
- Accurate understanding of consumer preferences
- High cost of poultry equipment, Vaccines, etc.
- Maintaining quality standards
- Poorly managed Waste disposals
- Attracting & skilling of workforce
- Inappropriate cold chain infrastructure
- Increasing raw materials of feed and intern feed cost

Emerging Skill Needs

- Storage, Advanced packaging, Cold chain & Transport
- Knowledge about feed & dietary supplements
- Quarantine measures & Quality testing
- Disease diagnosis & Epidemiology
- Waste management
- Rearing of poultry fowls like Quail, Turkey, Emu etc.
- Poultry farm management
- Genetics & breeding
- Export potential and related quality, legal and documentation aspects

Fisheries Segment

Indian fisheries & aquaculture rather than providing livelihood support is an important sector of food production that supports achieving nutritional security. India occupies 3rd position in fisheries production & 2nd in aquaculture in the world market. Fisheries support 14 million people in India by giving employment opportunities & supporting agricultural exports. In 2022-23, the total fish production is estimated to be 175.45 lakh tonnes accounting for 8% of global fish production. About 74 % of the total production is from inland fisheries & rest is from merine fisheries. About 75 countries across the world are beneficiaries of the export of fish & fish products from India. Fisheries export covers a major portion in agriculture export with 17.35 lakh tonnes in quantity & Rs.776.4 billion rupees in value. This accounts for 10% of total exports & 20% of agricultural exports from India. The contribution of the fisheries sector to the country's GDP is 1.09 %. Also, fisheries contribute 6.7 % to agricultural GDP. Besides large scale freshwater food fish culture, ornamental fish culture & high value marine fish farming is gaining importance recently.

Challenges

- Lack of training partners in fisheries
- Attracting opportunities in other sectors
- Evolving job roles with technical skills
- Seasonal nature of employment
- Indiscriminate fishing & habitat loss
- Depletion & pollution of water sources
- Natural disasters like flood, cyclones, etc.
- Upgradation of skills of fishermen
- Quality control issues in exports of fisheries sector

Emerging Skill Needs

- Risk management & climate change adaptation
- Weather forecast & Early warning system
- Mariculture of filter feeders
- Hatchery management
- Skills for handling Fish aggregating devices & other equipment
- Diversification of fisheries (Polyculture), cage culture, use of ICT for marine produce
- Seaweed farming & Spirulina production
- Supply chain management
- Quality testing & quarantine measures
- Artificial reef/ Artificial fish habitat technology

Animal Husbandry

Animal husbandry along with agriculture, dairying, fisheries is an integral part of human life since the starting of civilization. Animal husbandry deals with the agricultural practice of breeding & raising livestock. It not only contributes to the food basket & animal draught power but also to maintain ecological balance. Livestock forms important livelihood activity for farmers & also supports by providing critical inputs to agriculture. India has a rich resource of livestock which aids in improving the socio-economic conditions of rural masses. About 30.19 million people in India depend on livestock for their livelihood which is about 8.8% of the total population. The value of the livestock sector was 1725064 crores during 2022-23 as per Central Statistics Office (CSO). The total livestock population in India is 512.05 million which accounts for 10.71% of the world's livestock population. The livestock sector contributes 5.73 % to the country's GVA & 30.38 % to the total agricultural GVA of India.

Challenges

- Disease epidemics emergence of certain diseases ex. Lumpy skin disease intermittently
- Shortage of feed & fodder
- Low knowledge of scientific rearing, balanced ration, breeding and animal management
- Hygiene maintenance in the farm
- Maintenance of reliable database
- Changing the perception of farmers about this sector as a supplementary farming activity to the main business activity
- Highly unorganized sector

Emerging Skill Needs

- Scientific management and feeding practices
- Production and conservation of feed and fodder
- Breed improvement
- Animal health care
- Germplasm conservation & genetic up-gradation
- Evaluating semen stations
- Biosecurity, automation & modernisation of equipment
- Animal quarantine & certification service
- Quality control testing of veterinary biologicals & Vaccination (Master Vaccinator)

Farm Mechanisation

Farm mechanisation is a crucial tool for modernisation & commercialisation of agriculture as it improves productivity & timeliness of agriculture operations, aids in value addition, bring down the cost of cultivation & enables climate change adaptation. In the last few years, there has been an inclination towards the use of mechanical & electrical sources of power to mitigate the labour shortage & to facilitate judicious use of resources. The level of farm mechanisation in India stands at 40-45%. It is estimated that the use of proper equipment can increase productivity by 30% & reduce cost by 20%. India is the largest tractor market in the world. The upcoming phase of agriculture in the country will be driven by innovation in the farm machinery sector. Various policy interventions like Sub Mission on Agricultural Mechanisation (SMAM) have been introduced by the government to boost mechanisation in India. Farm power availability in India was 3.04 kW/ha (2022-23) & has set a target to increase it to 4 kW/ha by 2030 to cope up with rising needs. But mechanization is lower level in India compared to countries like USA, Brazil, China and other advanced countries. Input Survey data for the year 2017 indicate that the machinery usage was the highest in soil preparation (90.7%) followed by harvesting (27.5%), sowing/planting (20.5%), weeding & plant protection (16%), and straw management (6.2%). The farm mechanization market value was Rs. 1023 billion in 2022 is estimated to reach Rs. 1853 billion by 2028. India is the largest tractor market in the world. The sale of tractors & power tillers has shown a growth with CAGR of 6% during the period from 2005-06 to 2022-23. The precision agriculture technology for farms has spawned a new incarnation of the sector, resulting in greater yields with lesser inputs. Evolving technologies like Drones, Artificial intelligence, Robotics, etc. are crucial inventions to the agriculture sector & offers a long-term solution but demands support from the government, technology giants, etc

Challenges

- Farm machinery suitable to farming in Hill topography and terrain
- Upskilling of existing workers
- Evolving job roles with high technical skills
- Adequate infrastructure & training partners
- Fragmentation of land holdings
- Large presence of small & marginal farmers

Emerging Skill Needs

- Custom hiring models
- Agriculture machinery banks
- Commodity & location specific technologies
- Repair & Maintenance of new technologies
- Irrigation & Plant protection technologies including advanced technologies
- Crop health monitoring
- Artificial intelligence
- Quality testing of newly developed technologies
- Digital farming – GPS &GIS

Watershed Management

Watershed Management India is heading towards a looming water crisis. Accessibility to safe drinking water & dwindling groundwater is grave problems. Farmers are facing bad times in managing crop cycles with the unavailability of water India secured 120th rank among 122 countries in water quality index. The Asian Development Bank has forecasted that by 2030, 50% of India will face water deficit. Ironically India is the 9th wettest country in the world & receives rainfall of 1170 mm. Lack of sensitisation to the conservation of water & pollution of water resources has resulted in the worst situation. Infrastructure for storage/ conservation of water resources is the solution for addressing the water crisis in India. Watershed management is a viable option to harness production requirements in the agriculture sector, especially in rain-fed unirrigated areas. The essence of watershed management is balancing the soil & water resources between upstream & downstream areas within watershed intended to the conservation of natural resources and raising agricultural productivity & standard of living of inhabitants.

Challenges

- Effective people's participation
- Increasing awareness about the importance of watershed
- Co-operation of Ministries like the forest, agriculture, etc.

Emerging Skill Needs

- Resource management & problem identification
- Watershed monitoring & assessment
- Use of GIS & map to analyse watershed
- Rural capacity building and information sharing
- Erosion control & rehabilitation techniques
- Water quality monitoring
- Development of watershed atlas
- Cartography

Agri-Information Management

While the Indian agro information system also known as the extension system, is now guided by a variety of models, schemes, and institutions, public sector extension continues to dominate. Though ICAR's extension initiatives have been important to transformations in Indian agriculture, their capacity and reach have always been limited compared to those of first-line extension systems run by State-level departments of agriculture. Further, since agriculture is a State subject, the mode of organization and operation of public extension systems vary widely across States.

The proportion of farmers with access to information has been found to increase with an increase in the size of the holdings. Small landholders have been found to rely mainly on local sources of information, such as progressive farmers (20%) and input dealers (19%), along with the radio (13%). Only 4.8% of smallholders view the extension workers as a primary source of information, as compared to 9.8% of medium farmers and 12.4% of large farmers. These observations have serious implications for organizing the extension system in India, where 83 percent of farmers meet their livelihoods from small and marginal landholdings.

Challenges

- Identification of farmer's training needs
- Attracting skilled workforce
- Accurate understanding of training needs
- Monitoring & Evaluation of the extension system

Emerging Skill Needs

- Digital literacy
- Leadership skills with multi-lingual proficiency
- Dissemination of new technologies
- Good communication & teaching skills

Commodity Management

Commodity exchanges have become a crucial part of the financial markets of the economy as an effective price risk management tool. It is widely recognised as commodity futures markets. Price discovery, Price risk management, Easiness of selling & adoption of new technologies are the attractive features of the commodity markets. The first technology-driven agricultural commodity exchange in India is NCDEX. About 25 agricultural & non-agricultural commodities were offered by NCDEX for future trading. As per the reports of SEBI, 98% of the turnover of NCDEX was due to agricultural products. Lack of participants with adequate capital, lack of standardisation & warehousing facility, etc. are the challenges prevailing in the agri-commodity market in India.

Challenges

- Accurate understanding of trends in supply chain
- Evolving changes in the supply chain of commodities

Emerging Skill Needs

- Negotiation and conflict-resolution skills
- Multi-tasking & managerial skills
- Proficiency with soft wares & technology
- Technical knowledge about trends in the sector

Other Allied

Apiculture

The study & practice of beekeeping to produce natural honey is known as Apiculture. Beeswax, propolis, royal jelly, honeycomb, etc. – the by-products of apiculture are also in high demand in the market. In India, apiculture is practiced as both full-time occupation & as an agro-based subsidiary enterprise providing supplementary income. The Indian apiculture market was worth INR 18836 million in 2022. As per FAO 2021 report, India ranks first among south Asian countries in honey production. But India has a lower per capita consumption of honey than developed countries because of the lack of awareness about the nutritional benefits of honey. Apiculture not only provides a supplementary income but as a crucial element in pollination increases the productivity of crops too. The Apiculture industry can be a major foreign exchange earner if the standards for the exports are met.

Challenges

- Inadequate knowledge among youth
- Attracting skilled labours
- Climate change & Natural calamities
- Reducing green cover
- Radiation from mobiles
- Lack of proper marketing

Emerging Skill Needs

- Modern hives
- Commercial beekeeping
- Organic honey production
- Increasing market of by-products
- Value addition
- Advanced packaging
- Skills to handle modern equipment

Mushroom Growing

Mushroom farming in India is showing an increasing trend & has developed as an export-oriented business. Mushroom production in India is reported as 285000 MT (Agri stat, MoAFW 2022). India ranks 6th in mushroom production in the world. The mushroom industry in India has registered an average growth rate of 6% per annum in last decade. The Per capita consumption of mushrooms is very meager in India. Indian mushroom industry is majorly focused on white button mushrooms accounting for 73% of mushroom production.

During 2022-23, India exported mushrooms of 7768 MT worth USD 16.16. Mushrooms pave an efficient way of conversion of agricultural wastes into valuable protein & have a huge potential of generating additional income & employment. Mushrooms for pharmaceutical purposes also presents immense opportunities.

Challenges

- Attracting trained manpower
- Contamination
- Climate changes

Emerging Skill Needs

- Mother & Bed Spawn production
- Compost technology
- Prodction of new varieties
- Emerging export potential
- Production at controlled conditions data
- Advanced packaging (Ready to grow packs) & shelf life enhancement
- Development of pure culture

Sericulture

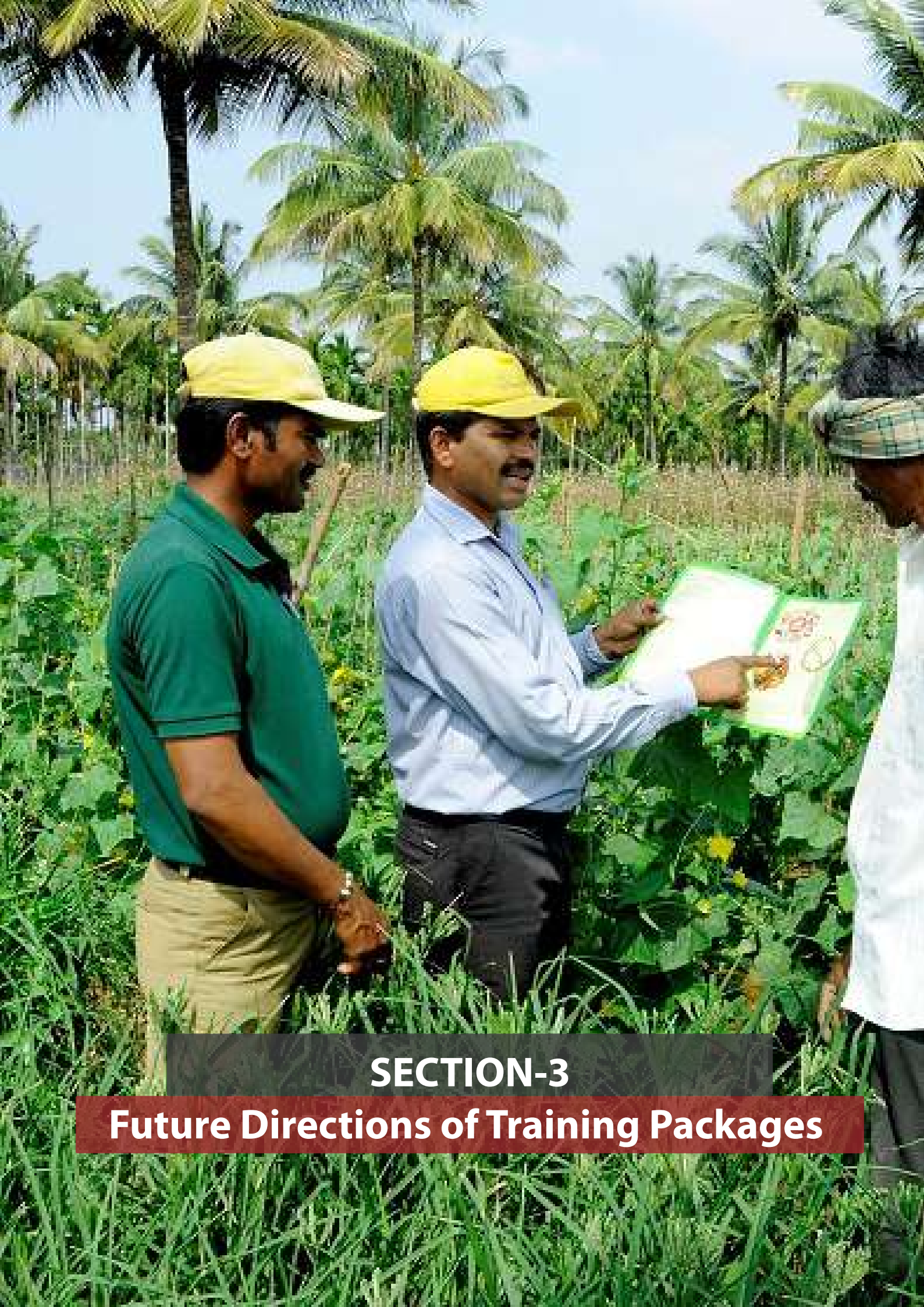
The silk industry in India is one of the large generators of employment & foreign exchange. India is the second large producer of silk & largest consumer of raw silk & silk fabrics with sericulture activities spread over 52,360 villages. During 2021-22, it provided employment opportunities to over 8.6 million people in the country. The export of silk & silk products from India was worth US $ 220.58 million in 2022-23. In India, both export & domestic demand drives the silk market.

Challenges

- Price fluctuation
- Lack of awareness about the market trend
- Competition from synthetic fibres
- Skill up-gradation
- Climate changes
- Low awareness about non-mulberry silks

Emerging Skill Needs

- Mechanisation in the silk industry (Automatic reeling machines etc.)
- Climate-resilient sericulture
- Biovoltine sericulture
- Fibroin extraction
- Silkworm powder preparation
- Cocoon crafts



SECTION-3

Future Directions of Training Packages

Section 3
Future Directions of Training Packages

The future direction of training packages is driven majorly by two factors:

Changes taking place in the industry due to technological advancements and emerging opportunities in the sector.

New policies by the government that initiate changes in the training packages.

Changing Industry Requirements:

As industry needs to change, adapt & grow, so do the training requirements. Therefore, to derive more profit from the agriculture sector, the skills & knowledge involved in the sector are rapidly evolving to be more sustainable & competitive. These changes are continuously reflected in the training packages. Training packages need to be updated to keep pace with emerging job opportunities.

Changes in the training packages are inevitable in improving the consistency of the quality of the training and assessments. NSDC & Sector skill councils are responsible for developing, maintaining and endorsing training packages according to the standards. An environmental scan, as the name suggests scans the environment for the emerging issues impacting the skills and knowledge required by the workforce in the sector. It aids to alert the sector skill councils, training providers, etc. in directing towards the emerging training package as per industry requirements.

New Policy Requirements

With the prime aim of job creation, the Government of India is launching many initiatives which have immense potential to innovate the training packages. The Government initiatives to reform education and training sectors in each year necessitates adequate changes in the training packages. Various government initiatives like Skill India, National Skill Development Mission, PMKVY, etc. are intended to skill a greater number of citizens to help them to take up entrepreneurship. These initiatives are demanding a rise in standards of training packages. Sector skill councils are working with policymakers to clarify and finalize policy for the development of streamlined training packages.

Continues Improvement of Training Packages

Keeping in view of the diverse nature of the industry and its geographic spread, registered training partners with the scope of ASCI qualification packs range from the large scale public providers to small scale, niche market operators across urban, regional and remote India. As of Financial year, 2018-19, ASCI has developed 173 qualification packs under 16 different segments.

Number of Job Roles Developed

S.No	Segments	No. of Job Roles
1	Agriculture Crop Production	9
2	Agri enterpreneurship and rural entrepreneurship	6
3	Production Horticulture	21
4	Amenity Horticulture & Landscaping	7
5	Post-harvest Supply Chain Management	8
6	Farm Mechanization & Precision Farming	21
7	Seed Industry Segment	5
8	Soil Health Management	2
9	Commodity Management	8
10	Agri-information Management	3
11	Other Allied (AGRI)	4
12	Forestry/ Agroforestry	7
13	Watershed Management	7
14	Dairy Farm Management	8
15	Animal Husbandry & Other Veterinary Related.	4
16	Poultry Farm Management	7
17	Fisheries	23
18	Equine management	1
19	Critical skills under Indo-Australia project	5 QPs and 20 NOS

APPENDIX

APPENDIX - A

Qualification Packs in Demand

Segments	Job Roles/QPs
Agriculture Crop Production	• Organic Grower • Vermicompost Producer • Paddy Farmer • Pulses Cultivator • Group Farming Practitioner
Production Horticulture	• Medicinal Plants Grower • Nursery Worker • Mango Grower • Coconut Grower Friends of Coconut Tree • Tea Plantation Worker • Tuber Crop Cultivator • Solanaceous Crop Cultivator • Bulb Crop Cultivator
Amenity Horticulture & Landscaping	• Gardener • Floriculturist - Open Cultivation • Floriculturist - Protected Cultivation • Gardener Cum Nursery Raiser
Watershed Management	• Watershed Supervisor Watershed Assistant
Post Harvest Supply Chain Management	• Supply Chain Field Assistant • Cold Storage Supervisor • Cold Store Keeper
Farm Mechanization & Precision Farming	• Micro Irrigation Technician • Tractor Mechanic • Tractor Operator • Greenhouse Operator
Forestry / Agroforestry	• Non Timber Forest Produce Collector • Forest Nursery Raiser
Seed Industry Segment	• Quality Seed Grower • Seed Processing Worker
Soil Health Management	• Soil & Water Testing Lab Analyst • Soil & Water Testing Lab Assistant • Soil Sampler/Collector
Agri - Information Management	• Agriculture Extension Service Provider • Agriculture Extension Executive • Community Service Provider
Other Allied (Agri)	• Mushroom Grower • Barefoot Technician • Sericulturist • Beekeeper
Dairy Farm Management	• Dairy Farmer/Entrepreneur
Poultry Farm Management	• Small Poultry Farmer • Broiler/Layer Farm Worker
Animal Husbandry & Others (veterinary Related)	• Animal Health Worker • Artificial Insemination Technician • Piggery Farmer • Veterinary Clinical Assistant
Fisheries	• Aquaculture Worker • Marine Capture fisherman Cum Primary Processor • Inland Capture fisherman Cum Primary Processor
Commodity Management	• Agri Commodity Procurement Manager • Agri Commodity Quality Assayer • Commodity Account Manager

APPENDIX -B

Emerging Job Roles

Segments	Job Roles/QPs
Agriculture Crop Production	• Farm Worker Farm Supervisor Farm Manager • Agri-Clinic & Agri-Business Centre Manager • Custom hiring Service Provider • Kisan Drone Operator • Precision Farming Technician
Production Horticulture	• Makhana Grower cum Processor • Spice Crop Cultivator • Temperate Fruit Grower • Orchard/Plantation Worker • Horticulture Supervisor • Hydroponics Technician • Horticulturist-Protected Cultivation
Fisheries	• Deep Sea Fisher
Farm mechanization	• Solar Pump Technician
Forestry	• Urban Forest Developer
FPOs and farmers collectives	• Institution Development Manager • Group Farming Practitioner

APPENDIX -C

The Relevance of Vet Courses

The technological advancements have increased the demand for higher education in the industries. But due to government intervention, the industry has started focusing on the relevance of skill specifications in addition to the qualifications in the labour force.

The labour participation rate (LFPR) in India among the population whose age is 15 years and above has reduced to 51.8% in 2022-23 from 57.9 in 2011-12. The LFPR is the section of working population in the economy currently employed or seeking employment. The report highlighted that there was a decline in the LFPR for both males and females. But this fall has been more drastic in case of females than males. Historically, the participation of woman in the labourforce has been low. But, between 2011-12 and 2022-23 it has remained more or less same at 31.6 percent. Whereas the LFPR for males dipped by 3% to 77.4% from its previous level of 79.8 percent. If we look across sectors, the fall in LFPR turned out to be higher in rural areas (67.7% in 2011-12 to 56.7% in 2022-23) than in in urban areas (from 49.3% in 2011-12 to 49.4% in 2022-23) in 15 years and above population. However, in last 5 years from 37.5 in 2018-19 to 54.6% in 2022-23.

During the period 2011-22 the workforce shift from agriculture to non-farm sectors has increased with the drop of 26 million jobs in agriculture and 33 million rises in jobs in non-farm sectors. The global rise of independent work and micro-entrepreneurship, aided by new digital ecosystems, is mirrored in India, where they are providing new work opportunities with better pay and links to organised value chains, including in parts of the country less covered by formal labour markets. Our initial estimates are that the rapidly growing sectors of cab- hailing platforms, e-commerce, digital financial services through networks of banking correspondents, and lending for micro-entrepreneurship and self-help groups have improved income opportunities for 18 to 22 million workers in about the past three years.

India needs to collect more frequent, timely, and relevant labour market data to understand trends in gainful employment. Government could help stimulate the creation of gainful employment through targeted programmes and by further removing hurdles that block private investment and innovation. Business and policymakers can work together in areas such as boosting growth in the labour-intensive tourism sector, unlocking the digital economy's potential to create work opportunities, and reskilling of the workforce.

The working-age population in India grows by 16 million every year.

Loopholes in skill development initiatives for the new entrant workforce and the existing workforce can be resolved if India takes certain measures such as:

- Focusing on the demand-supply mismatches and keeping an updated database on geographic specific job opportunities.
- To check high dropout rates during training,
- Inadequate employer linkages, and a passive approach to seeking employment—all of which result in high attrition rates in the first few months of employment.
- Demand-driven models for skills training, with the curriculum designed to resolve common points of failure for employers, can help establish a higher return on investment for skills training programs and could result in more sustainable benefits to both workers and employers.

APPENDIX -D

Methodology

As an annual document, the environmental scan is an evolving story. Market factors and other externalities may result in subtle or gradual changes with little or no discernible short to medium term impact on the enterprise or its workforce.

Each year, Agriculture Skill Council of India undertakes an intensive consultation process with the enterprises, industry bodies, and other stakeholders to gather real-time view on those factors shaping their operations, impacting on their workforce and its skills base, how well-or not- the tertiary sector is responding. These views are tested across the nation on various workshops and panel discussions.

In addition, we draw on advice and feedback gathered throughout the year during the continuous improvement of Training Packages and workforce development activities.

APPENDIX -E

References

1. Websites accessed:

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APPENDIX -F

Glossary and Definitions:

Ministry of Skill Development and Entrepreneurship (MSDE)

The Ministry of Skill Development and Entrepreneurship was set up by the Government of India on 9th Nov 2014 to coordinate all skill development efforts across the country. Industrial Training and Apprenticeship and other skill development responsibilities were transferred from the Ministry of Labour and Employment to this newly made Ministry on 16 April 2015. It aims to remove the disconnect between demand and supply of skilled manpower, build new skills and bring innovative thinking not only for existing jobs but also for new job roles that are to be created.

Directorate General of Training

The two verticals of Training and Apprenticeship under DGET, Ministry of Labour & Employment (MoLE) have been shifted to the Ministry of Skill Development and Entrepreneurship from 16th April 2015. These two verticals will function through Directorate of Training and Directorate of Apprenticeship Training respectively under the Directorate General of Training under the Ministry of Skill Development and Entrepreneurship. It will be responsible for maintaining existing skill training structures in the country through the National Council for Vocational Training (NCVT). Its large institutional framework consisting of ITIs, ATIs, RVTIs and other national institutes will act as tools of execution for Mission activities..

National Skill Development Corporation

The National Skill Development Corporation India (NSDC) was set up as a one of its kind, Public-Private Partnership Company with the primary mandate of catalysing the skills landscape in India.

National Skill Development Agency

National Skill Development Agency (NSDA) provides skill development funding either as loans or as equity and supports financial incentives to select private sector initiatives to improve financial viability through tax breaks etc. NSDC's financing initiatives provide funding through equity and grants.

National Skill Development Fund

The National Skill Development Fund was set up in 2009 by the Government of India for raising funds both from Government and Non-Government sectors for skill development in the country.

The Fund is contributed by various Government sources, and other donors/ contributors to enhance, stimulate and develop the skills of Indian youth by various sector specific programs.

National Skills Research Division (NSRD)

National Skills Research Division, under NSDA, will serve as the apex body for providing technical and research support to the Mission. This institution will act as a think-tank for Ministry of Skill Development and Entrepreneurship and be the core skill development hub, which will connect implementation of the Mission with academic research and data.

National Skill Development Mission or Skill India Mission

The Mission has been developed to create convergence across sectors and States in terms of skill training activities. It will be implemented through a streamlined institutional mechanism driven by Ministry of Skill Development and Entrepreneurship (MSDE). Mission Directorate will be supported by three other institutions: National Skill Development Agency (NSDA), National Skill Development Corporation (NSDC), and Directorate General of Training (DGT).

National Skills Qualifications Framework (NSQF)

The National Skills Qualifications Framework is a competency-based framework that organizes all qualifications according to a series of levels of knowledge, skills, and aptitude. These levels, graded from one to ten, are defined in terms of learning outcomes which the learner must possess regardless of whether they are obtained through formal, non-formal or informal learning.

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Definitions Applicable to NSQF

- Skill means the proven ability to use acquired knowledge, skills and personal and social abilities, in the discharge of responsibility roles. It is the ability to do a job well.
- Credit is a recognition that a learner has successfully learned skill to a qualification at a given level.
- Knowledge means the outcome of information through learning. Knowledge is the body of facts, principles, theories, and practices that is related to a field of work or study. Knowledge is described as theoretical and/or factual.
- Learner refers to an individual undergoing skill development training, whether in a formal or informal setting.
- Learning Outcomes represent what a learner knows, understands and is able to do on completion of a learning process, and which would be expressed in terms of knowledge, skills, and competence.
- Qualification means a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards.
- Skills means the ability to apply knowledge and use know-how to complete tasks and solve problems.
- Skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools, and instruments).
- Trainer means someone who trains, instructs, teaches or otherwise enables the learner(s) to acquire the appropriate knowledge and skills.
- Training Provider, Institute and Institution refer to any organization providing knowledge and skills to learners.
- Recognition of Prior Learning (RPL) is a platform to provide recognition to the informal learning or learning through work to get equal acceptance as the formal levels of education. It aims to appreciate prior learning irrespective of the medium of achieving it. RPL can help them get assessed and certified on their current competencies as per NSQF levels.

Sector Skill Councils (SSC)

Sector Skill Councils are set up as autonomous industry-led bodies by MSDE. They create Occupational Standards and Qualification Packs, develop Competency Framework, conduct Train the Trainer Programs, conduct Skill Gap Studies and assess and certify trainees on the curriculum aligned to National Occupational Standards developed by them.

Definitions Applicable to SSC

- **Sector:** Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
- **Sub-sector:** Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
- **Occupation:** Occupation is a set of job roles, which perform similar/ related set of functions in the industry.
- **Function:** Function is an activity necessary for achieving the key purpose of the sector, occupation, or an area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of OS.
- **Sub-function:** Sub-functions are sub-activities essential to fulfil achieving the objectives of the function.
- **Job role:** Job role defines a unique set of functions that together form a unique employment opportunity in an organization.
- **Occupational Standards (OS):** OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts. Performance Criteria Performance criteria are statements that together specify the standard of performance required when carrying out a task.
- **Qualifications Pack (QP):** QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.

- **National Occupational Standards (NOS):** NOS are occupational standards which apply uniquely in the Indian context.
- **Unit Code:** Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N' Unit Title. A Unit title gives a clear overall statement about what the incumbent should be able to do.
- **Description:** The description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
- **Scope:** Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which has a critical impact on the quality of performance required.
- **Knowledge and Understanding:** Knowledge and understanding are statements that together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard.
- **Organizational Context:** Organizational context includes the way the organization is structured and how it operates, including the extent of operative knowledge that managers have of their relevant areas of responsibility.
- **Technical Knowledge:** Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
- **Core skills:** Core skills or generic skills are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication-related skills that are applicable to most job roles.

Labour Market Information System (LMIS)

LMIS is an integrated set of institutional arrangements, procedures, mechanisms and data systems designed to produce labour market information as per global standards and best practices. The system brings together statistical (quantitative) and non-statistical (qualitative) information concerning labour market actors and their environment and generates key analysis and reports which can be used for various policy interventions by different government stakeholders, as well as by the industry at large.

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