CHAPTER 1: INTRODUCTION

"With wrong farming methods, we turn fertile land into desert. Unless we go back to organic farming and save the soil, there is no future" ……..Jaggi Vasudev.

1.1 Background

As people are becoming more health-conscious and environmental enthusiasts, there is a spurt in demand for organic products in both developed and developing countries. The increasing consumer demands for organically produced food and fibers provide new market opportunities for farmers and other stakeholders. As per the Research Institute of Organic Agriculture (FiBL) and International Federation for Organic Agriculture Movements (IFOAM) report 2021, 187 countries are involved in organic activities, and among these, 108 countries have organic regulations for producing organic products to explore both domestic and global markets (Willer et al., 2021a). With the world shifting towards sustainable agriculture, organic farming is one of the best ways to maintain an ecological balance of agriculture and ecological systems. Due to its many benefits for soil health, lack of adverse environmental effects, and decreased reliance on synthetic fertilizer, organic farming is a promising agricultural strategy for environmental sustainability (Kumar, 2022). Moreover, organic farming is a win-win situation for farmers and consumers. Farmers can fetch premium product prices, and consumers can enjoy healthy and safe foods (Misra & Singh, 2016).

Three different driving forces can be identified for growth in organic agriculture (FAO, n.d.):

a. *Consumer or market-driven*: In this case, products are identified through certification and labeling. The consumer strongly influences organic production, as buying decisions depend on how their food is produced, processed, handled, and marketed. Similarly, producers enjoy the price benefits when products are sold with proper labeling.
b. *Service-driven*: In the service-driven, initiatives to promote organic agriculture are mostly done by the government and provide subsidies to produce environmental goods and services like reducing groundwater pollution or maintaining the ecological balance.
c. *Farmer-driven*: In this case, farmers are aware of the harmful impact of the use of chemical fertilizer in conventional farming and adopt organic farming. Adopting organic farming improves farmer's family health and farm economies. In many

developing countries, organic agriculture is adopted to improve household food security or to reduce production costs.

The terms sustainable agriculture and organic agriculture are different, and certification is necessary for organic products. Sustainable agriculture is the practice of farming that adheres to environmental principles and includes a variety of factors such as the safety of human foods, the efficient use of non-renewable and on-farm resources, the economic viability of farm operations, and, finally, the improvement of the farmers' and society's overall quality of life (Adnan et al., 2018). Organic agriculture is a subset of sustainable agriculture that focuses on preserving agriculture's environmental and socioeconomic. In organic agriculture, product certification is required from approved agencies to claim the same as organic. Organic products enjoy trust based on the label or logo approved by the certification process. Thus, the main aim of organic certification is, (a) to provide an identifiable label or logo and (b) to assure consumers that the product is truly organic (Narayanan, 2005). Organic agriculture is at the center of three which are economic (source of income), social (health and employment), and environmental (methane emission, water resources) pillars of sustainable development.

1.2 Definitions

In 1999, the FAO/WHO Codex Alimentarius Commission defined "Organic agriculture as a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, account considering that regional conditions require locally adapted systems. The same is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system"(FAO, n.d.).

According to IFOAM, "Organic Agriculture is a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity, and cycles adapted to local conditions rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved" (IFOAM General Assembly, 2008). IFOAM defines four principles: health, ecology, fairness, and care, from where the roots of organic agriculture grow and develop.

The principles of health state that the health of individuals and communities is aligned with the health of the ecosystem. Fertile soil produces healthy crops which foster the health of people and animals. Organic agriculture avoids using chemical fertilizers, pesticides, and food additives, which are harmful to human health and aims to produce high-quality, nutritious food for a healthy and better life (*The Principle of Health | IFOAM*, n.d.). Organic production must adhere to these guidelines based on the ecological principle of recycling. Organic agriculture seeks to achieve ecological balance through the strategic planning of farming systems, the creation of habitats, and the protection of genetic and agricultural diversity. The stakeholders of the organic supply chain i.e. input suppliers, producers, processors, traders, or consumers, should work to protect and benefit the environment including landscapes, climate, habitats, biodiversity, air, and water (*The Principle of Ecology | IFOAM*, n.d.). The principle of fairness is characterized by equity, respect, justice, and stewardship of the shared world, both among people and other living beings. It emphasizes that all the parties involved in organic agriculture should ensure fairness at all levels of activities to all the stakeholders – farmers, workers, processors, distributors, traders, and consumers. Natural and environmental resources in organic farming should be managed socially and ecologically and held in trust for future generations (*The Principle of Fairness | IFOAM*, n.d.). The last tenet of organic farming is the principle of care, which states that farms must be run in a way that safeguards the environment and the health of future generations. While organic farmers can improve output and efficiency, this should not be done at the expense of people's health. Through an open and inclusive procedure, the right technology should be implemented, one that takes into account the priorities, expectations, and concerns of everyone who could be affected (*The Principle of Care | IFOAM*, n.d.).

The term “organic agriculture” includes all the activities from inputs to final manufactured goods and covers the fully organic and bio-dynamic supply chain, as well as cultural and social aspects of the movement, not just the farm production aspects (Kristiansen et al., 2006).

1.3 Evolution of Organic Agriculture

Before the development of industrialization, everything was organic, and the industrial revolution introduced the inorganic method of farming which has adverse effects on soil and ecology. The history of organic agriculture can be traced back to the “Neolithic Age” or “New Stone Age” practiced by ancient civilizations like the Hwang basin, Mesopotamia, etc. In ancient times, farmers started agricultural activities near the river belt using only natural

inputs. A brief description of using several organic inputs in agriculture and its allied activities is found in various ancient Indian literature like Ramayana, Mahabharata, Rig-veda, and Kautilya Arthasasthra (Behera et al., 2012). The first scientific approach to organic farming can be traced back to the *Vedas* of the "Later Vedic Period," which was 1000 BC – 600 BC. (Randhawa, 1986; Pereira, 1993 as cited in (Gopinath et al., 2016).

The origin of modern organic agriculture is linked with the development of industrially-based agriculture. Farmers adhere to many organic agriculture practices as the only option available before the development of chemically synthesized fertilizers, biocides, medicine, and mechanization. Sir Albert Howard, who was working in India in the 1920s, is considered one of the pioneers in organic agriculture for his extensive activities, including plant breeding. The activities and experiences of Sir Howard were distilled into his book "*The Waste Products of Agriculture*, Howard 1931. During that time, Robert McCarrison, a distinguished scientist, expounded on the importance of a wholesome diet grown on soil fertilized with manures and other organic matters (Kristiansen & Merfield, 2006). In Europe, the modern organic movement in Central Europe began in the middle of 1920 by Dr Rudolf Steiner. The concept of bio-dynamic agriculture, which is the earliest version of organic farming, was developed by him, and he introduced the trademark "Demeter" for the food produced on biodynamic farms. The "Demeter" is the first organic certification and labeling system created in 1924 to distinguish it from non-biodynamic products. However, the system is based on Steiner's philosophy and based on theology rather than science (Tomaš-Simin & Glavaš Trbić, 2016). Afterwards, these works were continued by J. I Rodale (USA), Lady Eva Balfour (UK), Peter Rush and Hon's Muller (Switzerland), Masanabu Fukuoka (Japan), and many others across the world (Arulraj, 2015). Lady Eve Balfour, in 1939, launched the "Haughley Experiment" to compare organic and conventional farming and published a book titled "Living Soil". Peter Rush and Hon's Muller developed and promoted the concept of "Biological Agriculture," and Masanabu Fukuota developed a radical no-till organic system, which is also known as "Fukuota Farming" (Aulakh & Ravisankar, 2017). However, the global movement for organic farming with proper standards and regulations started with the establishment of the International Federation of Organic Agriculture Movements (IFOAM) in 1971 in France.

The stages of development of organic farming in the world can be divided into three stages : (a) stage of emergence (1924-1970), (b) stage of expansion (1970-1990), and lastly (c) stage

of growth (After 1990) (Ma & Joachim, 2006). The first stage (stage of emergence) of the development of the organic movement faced problems in terms of uniformity in standards, certification, acceptance by the consumer and producers, and acceptance at the national level. The stage of expansion started with the establishment of IFOAM, other non-governmental organizations, and the establishment of the first legislative framework for adopting organic farming. In the third stage, organic production systems and standards are accepted across the globe, and all the countries are trying to promote organic farming and capture the organic market (Tomaš-Simin & Glavaš Trbić, 2016). The development of research institutions in organic agriculture is shown in the below table.

Table 1*: Showing the Development of Research Institutions in Organic Agriculture.*

Institution	**Founding Period**	**Main Objectives and Activities**
Rodale Institute, Pennsylvania, USA	1947	Founded in 1947, the institute's research and activities gained momentum in 1970 when 135 hectares of land were acquired for organic agricultural trials.
The Research Institute of Organic Agriculture (FiBL), Frick, Switzerland	1973	Founded by organic farming enthusiasts. FiBL expands the organic industry through research, teaching, and consulting. 11 missions FiBL boosts organic farming, animal welfare, and agroecology in the agri-food sector (FiBL , 2019).
International Federation of Organic Agriculture Movements (IFOAM)	1972	Roland Chevriot of Nature et Progres invites organic pioneers including Lady Eve Balfour (Soil Organization from Great Britain), Kjell Arman (Sweden biodynamic production association), and Jerome Goldstein (Rodale Press from USA) to form the International Federation of Organic Agriculture Movements. (IFOAM- International). Now the global network of IFOAM consists of more than 100 countries, and six continents and has 800 plus affiliates (IFOAM, n.d.).Since 2000, IFOAM and FiBL have published "World of Organic Agriculture" to track global organic agricultural trends.
Louis Bolk Institute, Driebergen, Norway	1976	Socially engaged researchers and consultants work at this institute. Through research in organic agriculture, nutrition, and health care, this institute helps farmers find practical solutions to farm management difficulties (Lousi Bolk Institute, n.d.).
Ludwig Boltzmann Institute for Organic Agriculture and Applied Ecology, Vienna, Austria	1980	Bio Research Austria, formerly Ludwig Boltzmann Institute for Organic Agriculture and Applied Ecology, Vienna, Austria. The group promotes organic crop production, agroecology, and food quality research with a multidisciplinary approach.
Elm Farm Research Centre, UK	1980	Together with other farms, this research center is a leading institute in UK organic agriculture.
Chair of Organic Agriculture, Witzenhausen, Germany	1981	The Chair of Organic Agriculture at Kassel University, Germany, was a momentous milestone in organic agriculture. After that, Bonn University founded an organic agricultural chair.

Source: Lampkin, Padel (1994) as cited in (Tomaš-Simin & Glavaš Trbić, 2016).

1.4 Organic Agriculture in the Present Scenario

In a recent scenario FiBL report 2021, the organic food market is one of the fastest growing sectors in the world, and country-wise, the United States is the largest organic market with a share of 49.50 billion euros, followed by Germany, and France which are 15.00 and 12.70 billion euros respectively. The largest single market was the U.S. market share with 41%, followed by the European Union and China share with 37% and 8.5% of the global market respectively. In per capita spending on organic food, Switzerland ranks tops with 418 euros, followed by Denmark and Luxembourg with 384 euros and 285 euros. As per the report of organic agriculture worldwide in 2022, 74.9 million hectares of land are organic, and the highest organic land is shared by Australia with 35.7 million hectares, followed by Argentina, and Uruguay with 4.50 and 2.70 million hectares, respectively. India is in an advantageous position as it has the largest number of organic producers in the world, which is 15,99,010, followed by Ethiopia and Tanzania with 2,19,566 and 1,48,607, respectively (Willer et al., 2021a). The details of the world scenario of the organic agriculture sector as per the report of "Research Institute of Organic Agriculture" (FiBL) are shown in the below table.

Table 2: ***Showing Organic Agriculture: Key Indicators Across the Globe***

Indicator	**Global Scenario**	**Top Countries**
Countries with organic activities	2020: 190 countries	
Organic Agricultural Land	2020: 74.90 million hectares (1999: 11 million hectares)	1. Australia (35.7 million hectares). 2. Argentina (4.5 million hectares). 3. Uruguay (2.7 million hectares).
Organic Share of total agricultural land	2020: 1.60%	1. Liechtenstein (41.60%). 2. Austria (26.50%). 3. Estonia (22.40%).
Producers	2020: 3.40 million producers. (1999: 2,00,000 producers).	1. India: 15,99,010 2. Ethiopia: 2,19,566 3. Tanzania: 1,48,607.
Organic Market	2020: 120.60 billion euros. In 2000, it was 15.10 billion euros.	1. USA: 49.50 billion euros 2. Germany: 15.00 billion euros 3. France: 12.7 billion euros
Per Capita Consumption	2015: 15.8. euros	1. Switzerland: 418 euros 2. Denmark: 384 euros 3. Luxembourg: 285 euros
Number of countries with organic regulation	2020: 76 countries (fully implemented)	
Number of affiliates of IFOAM-Organic International	2020: 714 affiliates	1.Germany: 79 affiliates 2. China: 46 affiliates 3. USA: 41 affiliates 4. India: 40 affiliates

Source: FiBL survey, 2022(Willer et al., 2021a).

1.5 Organic Agriculture Scenario in India

After independence, India witnessed a massive food crisis with deficient domestic food grain production (50.80 million tonnes), which was not enough to quell the hunger of the country's population. To mitigate this substantial demand-supply gap, India depends mainly on imports of food grain. Considering its import dependency, the term "ship-to-mouth" coined as food supply comes from other countries by ship and is used to feed the people directly. From 1947 to 1960, the situation was so bad that there were risks of famine occurrence. Therefore, the Green Revolution was initiated in 1960, mainly for rice and wheat to increase domestic production of food grain, alleviate extreme poverty and malnourishment in the country, and feed millions (Eliazer Nelson et al., 2019). The introduction of the green revolution transformed India to become self-sufficient in food grain and pulled out the fear psychosis of food security in the nation. With the expansion of farmland, double cropping in the existing farms, use of agri machinery, and use of high-yield varieties of seed, food grain production in India increased drastically from 74.23 million tonnes to 296.65 million tonnes during the period 1966-67 to 2019-20. An increase in agricultural production turned the country from an import-dependent to a major exporting nation worldwide (Agricultural Statistics at a Glance 2020, 2020). Although the production of food grain is increased by excessive use of chemicals, pesticides, and fungicides, it has a negative impact on soil health, the ecological system, and human health in the long term (Swarna R, 2016). The study by the Post Graduate Institution of Medical Education & Research (PGIMER) has shown a direct connection between the use of pesticides and growing incidents of cancer in Punjab as the state witnessed both positive and negative sides of the green revolution (Mittal et al., 2014). By considering the harmful impact of using chemical fertilizers and pesticides, organic farming is emerging as a tool to promote and enhance agroecosystem health for sustainable development (National Project on Organic Farming, 2010). Organic farming in India has been practiced for thousands of years, but since the early 1990, the term "organic agriculture" has been gaining popularity in India. In 1983, the first training center in organic agriculture was set up in Pondicherry under a project called Agriculture, Man, and Ecology,(AME) and the first conference on organic farming in India was organized by the Association of Propagation of Indigenous Genetic Resources in October 1984 at Wardha, Maharashtra (Organic Agriculture and Rural Poverty Alleviation, 2002).

The Indian Ministry of Commerce and Industry established the National Programme on Organic Production (NPOP) in 2000, establishing guidelines and regulations for organic

farming and organic products. To coordinate the NPOP, the Ministry of Commerce and Industry established the National Steering Committee for the NPOP (NSCOP), which is made up of representatives from the Ministry of Agriculture, the Agricultural and Processed Food Products Export Development Authority (APEDA), the Ministry of Commerce and Industry, the Coffee, Species, and Tea Boards, and other government and private organizations involved in organic movements. In 2001, the National Organic Certification Mark (hereafter "India Organic") was established by a committee that set standards for organic production (Morgera et al., 2012). In India, two groups recently began advocating for organic farming practices. The first section included the commercial growers of spices, tea, basmati rice, cotton, etc., who adopted organic for premium prices in the export market, and, the second section included the resource-poor farmers in rainfed marginal lands who adopted organic as an alternative livelihood approach, which not only assured clean environment and presumably healthy food but also ensured soil fertility, long-term sustainability and freedom from debt and market forces. The growth and milestones of the organic agriculture sector in India are shown in the table below.

Table 3: ***Showing Milestones and Growth in Organic Agriculture in India***

Year	**Milestones**
1983	First training center in organic agriculture was set up in Pondicherry under a project called Agriculture, Man, and Ecology (AME).
1984	Association of Propagation of Indigenous Genetic Resources (Wardha in Maharashtra) organized the first conference on organic farming in India.
1994	Meeting of organic farmers and agricultural organizations at Mahatma Gandhi's ashram in Sevagram. Several suggestions for advancing organic farming in India were included in this declaration.
1995	First networking workshop for Indian members of IFOAM - Organics International was hosted by the Institute for Integrated Rural Development, Aurangabad.
2000	Establishment of the task force on organic farming by the Government of India (GOI) and chaired by Dr. Kunwarji Bhai Jadav. The objective is to gather data, evaluate viable methods, and establish guidelines for organic farming.
2001	Launch of NPOP. NPOP provides information on organic production standards, accreditation criteria, and procedures.
2001	The Director General of Foreign Trade, GOI, notified the Export- Import Policy, 1997-2002, the procedure for exporting "certified organic products" on 1 October 2001.
2002	The Planning Commission's Steering Group on Agriculture and Allied Sectors, led by Dr. M. S. Swaminathan, recognised organic farming as a priority for India’s 10th Five Year Plan (2002-07.
2002	Launch of "India Organic" logo.
2003	Sikkim approved a law to go organic.
2004	The GOI launched the National Project on Organic Farming.

Table 3 (Continued)

2004	National Centre of Organic Farming (NCOF) was founded in Ghaziabad to administer the National Organic Farming Project.
2004	Indian Council of Agricultural Research, New Delhi, launched the Network Project on Organic Farming (NPOF) in 2004-05 with the Project Directorate for Farming Systems Research as a nodal institute. The goal was to establish a comprehensive technical package for organic farming nationwide.
2004	First Indian state to pass "The Mizoram Organic Farming Act, 2004"
2005	Government of India formulated the "Organic Farming Policy."
2006	The GOI's National Commission on Farming reported that organic farming might assist in tackling the agrarian issue.
2006	NPOP was deemed equivalent to European Union organic farming standards.
2006	USDA recognized APEDA's conformity evaluation for accrediting certification bodies for USDA's National Organic Program (NOP).
2007	NPOP equivalent to Swiss organic farming ordinance.
2008	Dr. Tej Pratap chairs India's Expert Committee. The Committee suggested launching a Mission Mode Project on Organic Farming under the Department of Agriculture and Cooperation, with NCOF as the national nodal agency, to promote organic farming in India.
2009	AGMARK developed the "Organic Agricultural Produce Grading and Marking Rules 2009" under India's Agricultural Produce (Grading and Marking) Act, 1937.
2009	Nürnberg Messe, Germany, and APEDA, India, staged the first BioFach India trade fair, now India's largest organic food and agriculture trade fair.
2011	The Participatory Guarantee System (PGS) movement was initiated in India by the PGS Organic Council, a coalition of non-governmental organizations.
2014	NPOP was revised.
2015	GOI formed an Organic and Non-Chemical Farming Task Force. Dr Anil Kumar Singh was the Task Force Convener.
2015	For the Indian market, the government has implemented the Participatory Guarantee System of India (PGS-India).
2015	The National Program on Organic Production was evaluated by the GOI's Parliamentary Estimates Committee headed by Dr. Murli Manohar Joshi.
2016	Sikkim became India's first organic state.
2016	Standards for the organic production system and the labeling of organically produced products have been notified by the Bureau of Indian Standards (BIS).
2016	By upgrading the ICAR Research Complex for the North East Region, the National Organic Farming Research Institute (NOFRI) of the Indian Council of Agricultural Research (ICAR) was established in Gangtok, Sikkim (Sikkim Centre).
2017	Government of India constituted a parliamentary standing committee on commerce with Shri Naresh Gujral as Chairman. On December 11, 2019, the Committee presented its 150th report to the Rajya Sabha, entitled Export of Organic Products - Challenges and Opportunities.
2017	In collaboration with IFOAM - Organics International, Germany, India hosted the 19th Organic World Congress in New Delhi.
2017	FSSAI notified Food Safety and Standards (Organic Foods) Regulations, 2017 on December 29, 2017.
2018	Sikkim, India's first 'completely organic' state, was awarded FAO's Future Policy Gold Award 2018, the "Oscar for great policies."

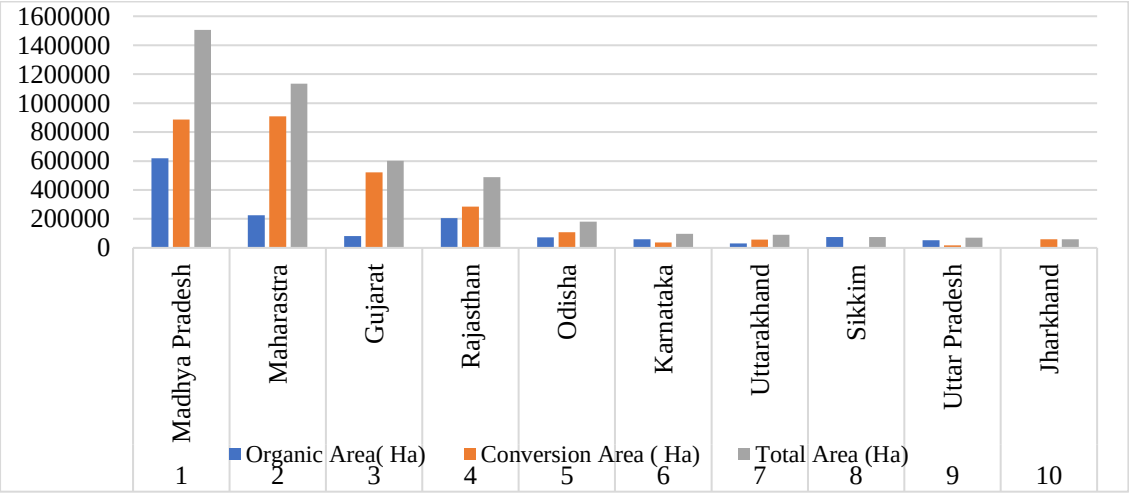
Table 3 (Continued)

2019	From April 1, 2019, organic food must have an FSSAI license and the "Jaivik Bharat" logo.
2019	Nagaland's Dimapur hosted the first IFOAM Asia Organic Youth Forum.
2019	Six farmers were given Padma Shri, the fourth -highest civilian award for their organic farming, for the first time in history.
2021	Mrs. Pappammal, a 105-year-old organic farmer and four other Tamil Nadu organic, received the Padma Shri Award for Agriculture in 2021, a tribute to all organic farmers in India.
2021	The USDA NOP decided to terminate its organic recognition agreement with India's APEDA on January 11, 2021. The EU has also placed tight limits on Indian organic products due to excessive ethylene oxide levels.

Source: Modified and updated from (Roy, 2020)**.**

According to the FiBL survey, 2022, As of 2020, India ranked fourth globally in terms of organic land area, with 2.66 million hectares. However, this represents only 1.50 percent of the nation's agricultural land. India has the highest number of organic producers worldwide, which is 15,99,010 (Willer et al., 2021b). Significant expansion in organic farmland occurred in 2020, with a rise of approximately 30,000 hectares, or approximately 1% from 2019 levels (India - Organic Industry Market Report - 2021, 2021). The most significant areas of organically certified land are located in the Indian states of Madhya Pradesh, Maharashtra, Rajasthan, and Gujarat. It is estimated that over 1.3 million hectares of land in these four states are currently being converted to organic practices. Sikkim is the only Indian state where all 76,000 acres of farmland are certified organic, making it a leader in the country's growing organic food movement (APEDA, 2021). The details of the state-wise area of organic land are shown in the figure below.

Figure 1: ***Showing State Wise (Top 10) Area of Organic Land in India (2021-2022)***

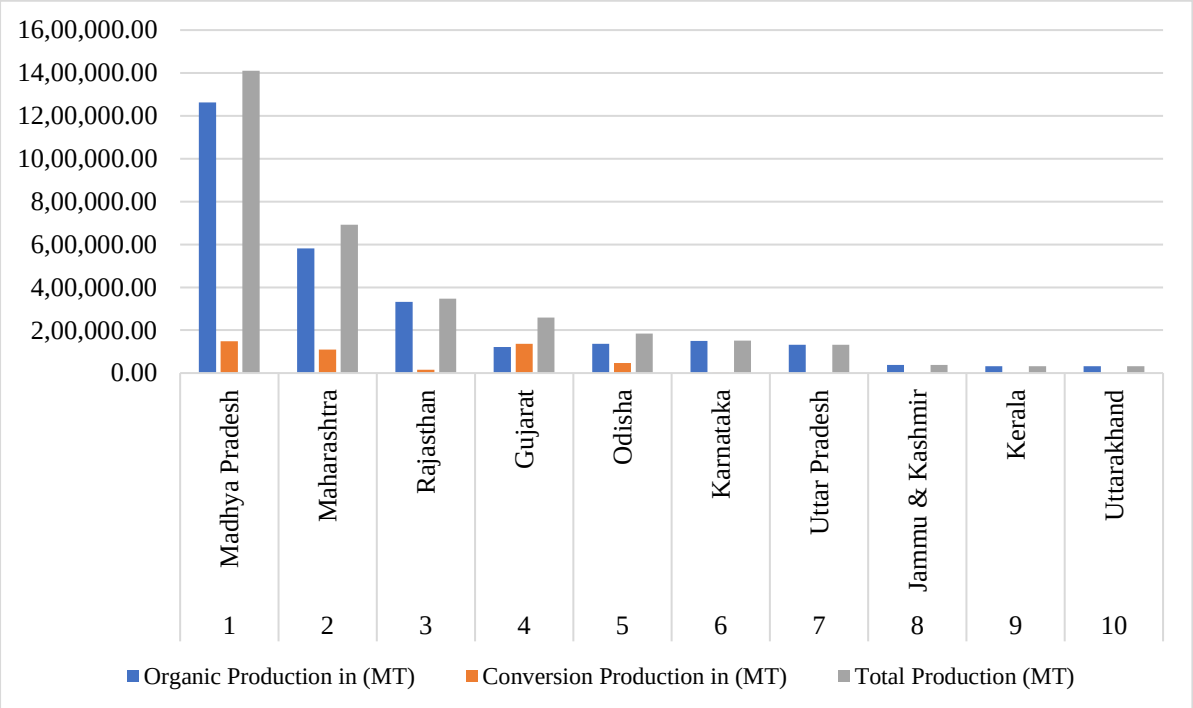


Source: APEDA, 2022, (APEDA, 2021).

1.5.1 Organic Food Market and Export Scenario in India

Organic food and drinks have much potential in India, a promising new market. India's organic food and beverage market is expected to grow to $138 million by 2024, a 13 percent compound annual growth rate [CAGR] (India - Organic Industry Market Report - 2021, 2021). India produced around 3410195.02 MT of various organic products and exported 460320.40 MT of its products to various countries mainly to the USA, European Union, Canada, and United Kingdom, during 2021-22. The total export value of organic products for 2021-22 is Rs. 5249.32 crore (771.49 million US dollars). Madhya Pradesh ranks top with a value of 190.08 million USD followed by Gujrat and Maharashtra with 106.92 and 102.46 million USD (APEDA, 2021). In state-wise organic farm production, Madhya Pradesh tops the list with production of 14,10,894.49 MT, followed by Maharashtra and Rajasthan at 6,91,419.72 MT and 3,46,961.32, respectively. The details of state-wise organic farm production (top 10 states) for the period 2021-22 are shown in the below figure.

Figure 2: ***Showing State Wise (Top 10) Organic Farm Production in India (2021-22)***



Source: APEDA,2022(APEDA, 2021).

Most of the organic products are exported to the European Union, followed by the USA and Canada. The details of the shares of the total export value of the top ten countries/ union are shown in the table below.

Table 4: ***Showing Top Ten Exporting Countries During 2022-2023***

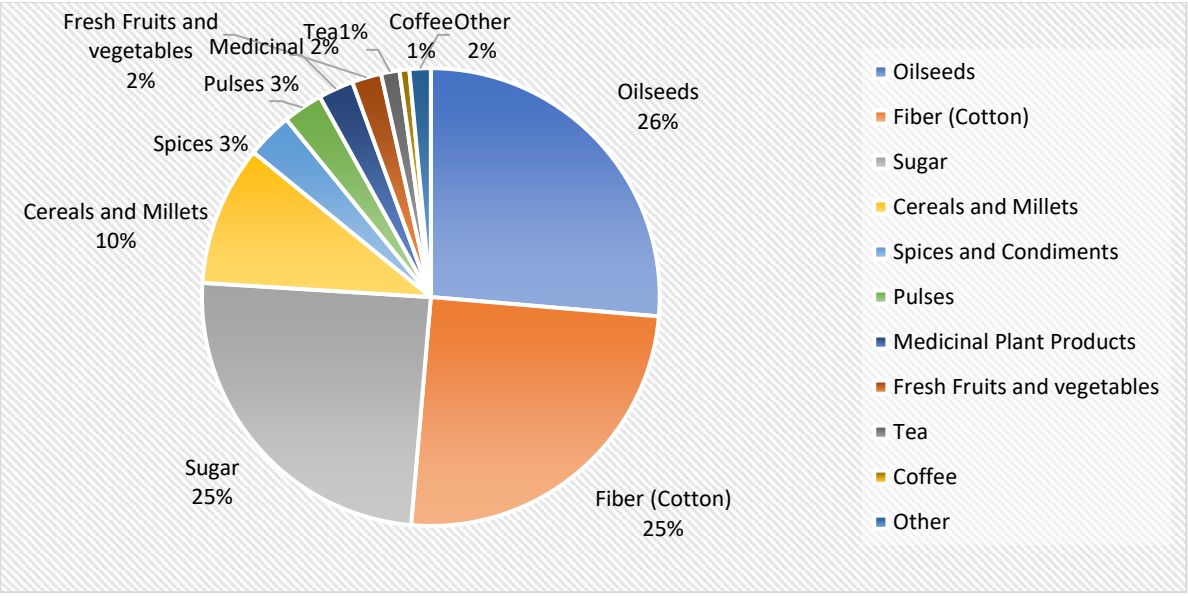
Sl. No.	Country Name	Exported Qty (MT)	Total Value (In crore Rs)	Percentage of Share in Total Value
1	European Union	117369.84	2726.30	49.98
2	USA	126804.57	2040.56	37.41
3	Canada	38726.39	332.23	6.09
4	Great Britain	11670.82	146.39	2.68
5	Switzerland	4630.46	92.62	1.69
6	Australia	1045.79	45.05	0.82
7	Vietnam	3649.19	20.72	0.37
8	Ecuador	1812.24	18.89	0.34
9	Israel	1720.73	15.92	0.29
10	Japan	223.43	15.86	0.29
Total		307653.7	5454.54	100

Source: APEDA**,** 2022 (APEDA, 2022)**.**

1.5.2 Organic Crop Production Scenario in India

As per the APEDA report, India produces around 3.2 million metric tonnes (MMT) of various organic crops during the year 2020-2021. Oil seeds share the majority of the production with a share of 26.34 percent, followed by fiber (cotton) and sugar with a share of 25.02 percent and 24.61 percent respectively (India - Organic Industry Market Report - 2021, 2021). The pictorial representation of the top ten categories of organic crops produced in India and the total list of shares of various categories of organic crops are shown in the below figure and table.

Figure 3: ***Showing the Top Ten Categories of Organic Crops Produced in India for the year 2021.***



Source: APEDA, as cited by (India - Organic Industry Market Report - 2021, 2021).

Various crops, such as cereals and millets, spices and condiments, pulses, and medicinal plants, each account for less than 10% of overall production. Fresh fruits and vegetables rank 8th in terms of production and share only 2.02 percent of the total production (Shown in the above figure).

India's total organic packaged food and beverage consumption in 2020 is 85 million US dollars. Domestic organic product consumption is low relative to worldwide consumption, accounting for less than 1% of global value demand and ranking 49th in terms of the size of the global organic market per capita. However, India ranks 4th in terms of global value growth, and to explore the expanding demand in the domestic market, various companies, retail chains, and Kirana stores are seeking to increase their market share through competitive pricing. In the segment of the organic food sector, SRESTA Natural Bioproducts with its 24 Mantra brand, leads the domestic market with a market share of 27 percent. Organic India and Champong Tea Exports rank second and third in the domestic market with a market share of 13.1 percent and 6.5 percent. Apart from these, other companies engaged in the organic food sector share around 46.10 percent of the organic market share in India (*India | Global Organic Trade Guide*, n.d.). India's high-income consumers are willing to consume organic products, and for the same retail chains, supermarkets, hypermarkets such as Reliance Jio (Jio mart), Aditya Birla Group, Avenue super marts (D Mart), and Future Groups are some retail points for organic products.

Table 5: ***Showing Organic Crop Production by Crop Category in Metric Tonne***

Sl. No.	Category of crops	Production (MT)	Percentage of share
1	Oilseeds	853755	26.34
2	Fiber (Cotton)	811008	25.02
3	Sugar	797628	24.61
4	Cereals and Millets	321006	9.90
5	Spices and Condiments	104821	3.23
6	Pulses	91040	2.80
7	Medicinal Plant Products	80534	2.48
8	Fresh Fruits and vegetables	67350	2.07
9	Tea	42121	1.29
10	Coffee	22402	0.69
11	Flowers	13191	0.40
12	Dry fruits	11500	0.35
13	Fodder	11060	0.34
14	Other	5797	0.17
15	On-farm processed food	4004	0.12
16	Tuber products	3135	0.09

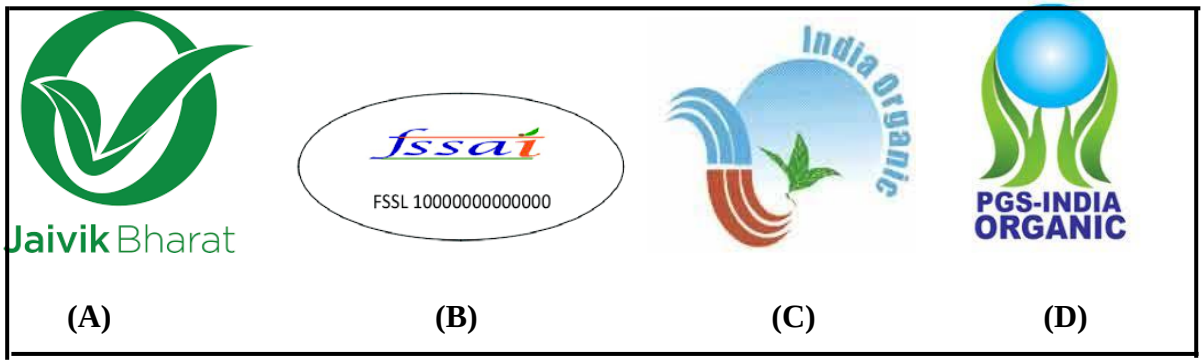
Source: APEDA, FAS New Delhi office research as cited by (India - Organic Industry Market Report - 2021, 2021).

1.5.3 Organic Certification and Standards in India

Food Safety and Standards Authority of India (FSSAI) has the mandate to regulate "organic food" under section "22" of the Food Safety Standards Act (2006) which was amended as Food Safety and Standards (Organic Foods) Regulations,2017. This regulation recognizes two systems of certification, i.e., the National Programme for Organic Production (NPOP) implemented by the Ministry of Commerce and Industry and the Participatory Guarantee System (PGS) implemented by the Ministry of Agriculture and Farmers Welfare (*FSSAI*, n.d.). The scope of NPOP certification is much broader as organic products with the NPOP logo can be traded in export and domestic markets, whereas PGS-India-certified products can be traded only in domestic markets. As of 21.12.2023, there are 28 accredited certification bodies (excluding five bodies that are delisted by the European Union w.e.f. 01.01.2022) under NPOP, and there are 562 Regional Councils (RC) under PGS-India (*Jaivik Bharat*, n.d.).

It is mandatory to use organic logo to trade any organic products in India. The consumer shall look for the Food Safety and Standard Authority of India's organic logo (A) and FSSAI logo license number (B). In addition, the label may carry the India Organic Logo (NPOP) certified or the PGS-India organic logo (PGS-India) under whichever system is certified, which is shown below with labels (C) and (D), respectively. The logo approved by regulatory bodies is shown below figure:

Figure 4: ***Showing Organic Logo Approved by Regulatory Bodies in India.***



Source : (*Jaivik Bharat*, n.d.)

1.5.4 Organic Agriculture in North Eastern Region Assam

The Northeastern part of India has tremendous potential for promotion of organic farming due to its low rates of synthetic fertilisers (12.0 kg/ha) and chemicals (Singh, et al., 2021). The land of this region is almost virgin and crops are grown are organic by default. Due to

low chemical usage, Northeast India has huge potential for organic crop production and to turn the region to “Organic Hub” for economic development of the region and for environmental sustainability (Singh, et al., 2021). Sikkim is the first organic state of India with all its land converted to organic and produces crops completely organic manner. Northeast shares around 3.68% of total organic land in India. Among all the states of the Northeastern region, Sikkim ranks 9th in India in term of organic land coverage with 75,475.28 hectares. Similarly, the ranking of other Northeastern states in terms of organic land coverage is as: 17th for Meghalaya, 18th for Assam, 19th for Mizoram, 20th for Tripura, 22nd for Arunachal Pradesh, 23rd for Nagaland, and 26th for Manipur (APEDA, 2022). In terms of state-wise organic production among the Northeastern states, Assam ranks first with 14,497.86 metric tonnes followed by Meghalaya with 9,919.69 metric tonnes.

Assam has 23,067.42 hectares of organic land, ranks 18th in terms of organic land, and also ranks 16th in terms of organic produce in India with 14,497.86 metric tonnes of various organic commodities for the year 2021-22 (APEDA, 2022). During 2021-22, however, it exported only 5.87 metric tonnes of organic products. Considering that the majority of the land in the state is organic by default, farmers can easily switch to organic farming which will turn Assam into an organic hub. With proper value addition of certified organic crops, it will help farmers to sell their crops for a premium price. As organic products continue to gain appeal on a global scale, the state of Assam is gearing up to participate in the next phase of the "organic farming green revolution”. Many different types of horticulture organic crops are being grown in these regions, by the initiatives of both government and private/individual. With proper value addition, these organic products has the opportunity to enter the growing domestic and international organic markets. Two approaches are found for developing and promoting organic agriculture: the demand-side approach and the supply-side approach. The demand side approach is driven by private agents (Entrepreneurs, Producer Organizations, etc) to create incentives for smallholder farmers through contracting and vertical coordination in the value chains(de Janvry & Sadoulet, 2020). In Assam, various firms and motivated individuals are engaged in organic production practices like Nahar Organics Pvt. Ltd. (Founded by Sunil Uttam and Binita Gogoi in 2014 at Guwahati); Pabhoi Greens (Founded in 1973 by Lt. Dr. Hemen Dutta (father of Neelam Dutta at Biswanath Chariali, Pabhoi Greens shifted to organic cultivation in the year 2003) and JeevAnkash Eco Products, (Founded by Mr. Gunajit Brahma (an alumnus of IIM Indore) in the year 2012 at Guwahati). In addition, there are around twenty-two organic processors certified by PGS India as on January 1, 2024

(Ankur Natural Farm, Boishnabi Tea, Bosundhara Tea, Camellia Tea, Changs Organic Farm, Goyaro Organic Farm, Innate Tea, Kanan Organic Farm, Komol Organic Farm, Kuhipat, Laipulia Organic Farm, Manjushree Green Tea Unit, Meghalee Organic Farm, Moitree Enterprise, Natural Health Organic Firm, Punyanjoili Organic Farm, Sanjeevani Organic Farm, Swagat Organic Tea Processing, Tailor Made Tea, Teportal Tea Farm, Yeshuraj Organic Farm and Zaroni Organic Tea) engaged in various organic crop production and processing like organic tea and other organic crops (*PGSI - Processor* 2024). The supply-side approach is driven by the government through various schemes and policies to promote organic agriculture. In Assam, organic farming is an emerging sector, and the government is promoting organic farming through three central sector government schemes as given below (*Organic Cultivation | Directorate of Horticulture & Food Processing | Government Of Assam, India*, n.d.):

a. Parampragat Krishi Vikas Yojana (PKVY)
b. Rashtriya Krishi Vikash Yojana- Organic (RKVY- Organic)
c. Mission Organic Value Chain Development in Northeastern (MOVCD- Assam)

The primary objective of the Parampragat Krishi Vikas Yojana (PKVY) is to increase soil fertility and encourage farmers to embrace organic production methods without using agrichemicals and fertilisers. The Partnership Guarantee Scheme (PGS) accreditation enables cluster farmers to certify the production process and gain access to the organic market. Rashtriya Krishi Vikash Yojana- Organic (RKVY-Organic) aims to develop a local organic market in the success of the RKVY scheme. The MOVCD scheme aims to develop certified organic production in a value chain mode in order to build a bridge between growers and consumers and to support the sustainable development of the entire value chain, beginning with inputs such as seeds, planting materials, and certification and continuing through the creation of facilities for collection, post-harvest management, aggregation, processing marketing, and brand building initiative.

1.6 Value Chain Analysis

In the era of cutthroat competition, industries regularly upgrade their value chains as a means of remaining competitive; this, in turn, leads to an increase in both efficiency and production. Exploring the organic food market requires meeting several stringent regulations, including certification requirements, so having a value chain that is both upstream and downstream is of utmost importance for this sector. A strong value chain provides an opportunity to gain

access to the efficiency of value-added operations/services. It also bring competitiveness to the supply chain through value addition to increase the production, trade, and income of farmers and other actors. The value chain includes the entire range of activities required to bring a product from the initial input-supply stage through various production phases to its final market destination. Value chain analysis is the process of breaking the chain into its constituent parts to have a better understanding of structure and functioning. As per the definition of Food and Agriculture Organization, a value chain can be defined as the full range of activities that are required to bring a product or service from conception through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use(Hellin & Meijer, 2006). In the value chain analysis of the food and vegetable sector, diamond numbers can be used to identify steps in the chain, and each diamond number breaks the value chain in the logical process or business unit (Tamasese, 2009a). Six decision diamonds in the chain are classified as input supplier, farm production, postharvest treatment, logistics, processing, and lastly, marketing. In contrast to the general agri-food value chain, the vegetable chain consists of five main groups, which are producers, transporters, traders, processors, exporters, and input suppliers are the sixth category in the same chain (J. C. Bidogeza et al., 2016). Although a strong value chain is of utmost importance to developing the agri-food sector, in developing countries, the value chain is still unorganized and needs a proper link from farm to customer. The study by Karim & Biswas(2016), classified the activities of farmers to consumers into three categories which are the value-adding process, the non-value-adding process, and the necessary non-value-adding process. The contribution of value-adding activities in the total value chain is less than that of the other two.

1.7 Value Chain of Organic Products

As people are becoming more health conscious, the demand for organic food consumption across the domestic and global market is increasing and consumers are willing to pay premium prices for value-added organic products (Mukherjee et al., 2018). Although India has the largest organic producers in the world, the size of India’s organic food market is less than one percent of the global organic food market. The organic food market in India is mostly export driven, which consists of around 79 percent, followed by the domestic irregular sector and domestic certified organised sector with 11 percent and 10 percent share, respectively(Yes Bank & Ingenus Strategy and Creative Research, 2016). The organic food market of India, mainly the export market, is dominated by non-value-added commodities.

Organic fresh produce also requires a highly sophisticated and integrated value chain compared to conventional crops; a strong network structure is inevitable. Organic products are mostly considered as value- added products, particularly in the context of developing countries, and various actors in the chain indulge in some kind of value addition/ value creation to explore the market(Sari et al., 2021). The efficient value chain is of utmost importance for marketing organic products, and it consists of optimization in the supply chain, upgrading strategies, management, and governance structure. In India, upgradation of value chain for organic produces are done by private players and through government initiatives. To capture the lucrative organic market, FPC/ FPOs are producing varieties of value-added products from organic produce like jam, jelly, juice, pickle, health mix, etc, with proper branding, packaging and labeling as per organic standards. The organic food value chain is being strengthened by the corporate sector's ongoing investments in agribusiness, organic farming, and agrotech facilities that comply with NPOP/USDA/EU standards. Various private key players in the Indian organic food sector like Suminter India Organics Private Limited, Nature Bio-foods Limited, Organic India Private Limited, Sresta Natural Bioproducts Limited, Phalada Agro Research Foundations Private Limited, Mehrotra Consumer Products Pvt., Morarka Organic Foods Limited, Nature Pearls Private Limited, Conscious Food Private Limited, Nourish Organics Foods Pvt. Ltd., Mother Earth, EcoFarms (India) Ltd., and EI World Agro & Organic Foods Pvt. Ltd are fuelling the organic market growth in India(IMARC, 2023). The government is promoting organic agriculture through various schemes, incentives, and subsidies, to establish a healthy and strong value chain from input suppliers to end customers. Hon’ble Prime Minister of India, Shri Narendra Modi, declared Sikkim as the first organic state of India on January 18, 2016, and put emphasis on other states to turn organic in line with Sikkim(NDTV, 2016). With an aim to develop a complete organic value chain, Mission Organic Value Chain Development (MOVCD) was launched during the year 2015-16. The scheme implemented in mission mode to link growers to end consumers and to support the development of the entire value chain, starting from inputs, seeds, and certification, to create facilities for collection, aggregation, processing, marketing, and brand building in the Northeast India(ASFAC, n.d.).

1.8 Problem Statements

As the global market size for organic products is expanding, both private players and government-supported schemes/FPC/FPO are actively participating in exploring this lucrative market. India ranks first with the highest number of organic producers in the world; however,

it ranks 49th in market size per capita, indicating a weak demand in the domestic market. India ranks 3rd in forecast value growth globally and indicates a strong potential for an increase in demand for organic produce during the forecast period 2021-2026(*India | Global Organic Trade Guide*, n.d.). Organic products require a sophisticated value chain with strict compliance with organic guidelines like certification, packaging, and use of organic logos. However, the market is dominated by non-value-added organic products. The disjuncture between the official standard of the global value chain and actual practices by farmers is found in the study by (Arora et al., 2013). Despite the huge potential of the organic market in India, a meager number of literature were published related to the value chain of organic crops in India. The majority of the study related to value chain analysis is confined to the conventional agri-food sector and covers various aspects of the chain related to mapping structure, analysis of margin, upgrading strategies, and governance structure. The study by Sahoo & Sarangi (2018), related to the value chain analysis of organic turmeric in Odisha, found the high cost of labor as a major constraint followed by personal obligation with traders in the value chain. Farmer's constraints are the major challenge to upgrading the value chain, and the study by Kulkarni & Shahid (2021) creates a system map in line with the Sikkim organic model after analyzing the constraints of the farmers. The lack of marketing infrastructure, inappropriate drying techniques, and limited overseas markets are major constraints found in the value chain of large cardamon in Sikkim(Yadav et al., 2018). Similar studies are performed by V et al. (2021) and Sherief (2021) and discuss the opportunities and constraints in the value chain. All the studies focus on specific areas or steps in the value chain, like mapping of products/services, analysis of marketing margin, opportunities and constraints in the chain, and governance structure of the chain. In the study by Baruah et al. (2022) analyzed the supply- demand gap of fruits in Assam and suggested various value addition measures like development of marketing infrastructure, post-harvest management, and formation of fruits producer Organization. However, the study is confined only to general fuits sector in Assam and does not make an attempt to know the value addition scope for organic fruits or crops. The author of the present study published two articles related to the value chain analysis of organic pumpkin and organic pineapple covering various aspects like network structure, determination of margin, constraints, and governance structure of the chain by taking the Mission Organic Value Chain Development (MOVCD) scheme as a base. However, as organic farming activities are promoted by both govt. and private players, no significant studies are found related to the intra or inter-firm comparison of govt and non-govt. sponsored firms. The present study also found that most of the studies were descriptive

and conceptual, and the constraints identified in their findings were not sufficiently summarised and analyzed. Assam and other Northeastern states of India have tremendous potential for the promotion of organic farming, and the MOVCD scheme was launched in the year 2015-16 to turn this region into the organic hub of India. Two studies related to the value chain analysis of organic tea by Deka & Goswami (2022), and Sandeep & Sharma (2023) suggest various policy measures to upgrade the chain. However, no significant studies related to the value chain analysis of organic produce are found in Assam apart from the study by the author related to the value chain analysis of organic pumpkins and organic pineapples. The study on the complete value chain of various organic crops in Assam will give an insight into the existing organic value chain and will be beneficial for policymakers, academicians and researchers. Moreover, the study also draws a comparative analysis of the value chain of government and non - government sponsored organic farms to know the existing value chain and scope further upgradation. The various actors in the value chain, including government, NGOs, and farmers, can find the findings of the study useful to devise policies for the region.

1.9 Research Queries

A complete and structured value chain is of utmost importance to market organic produce. The present study aims to know the existing value chain of five organic crops (organic pineapple, organic pumpkin, organic non-basmati rice, organic red rice, and organic turmeric) in Assam. Following are some of the few research questions that this study would address:

a. What are the various parties involved in the value chain of organic crops, and how do the products reach the end consumer?
b. Whether the organic products are moved through the organized sector or through the unorganized sector.
c. What are the average landholding sizes, where do organic farmers get their seed supply, how much do they produce, and what prices do they get?
d. What are the various sources of support services and information farmers receive?
e. What is the benefit-cost ratio, and marketing margin incurred by various actors in the chain?
f. What are the various value-adding activities performed by various chain actors?
g. What are the various technologies used in the production of organic crops?
h. What constraints faced by various chain actors in upgrading the value chain?
i. What are the various opportunities for upgrading the value chain?

j. What is the nature of the governance structure among various actors in the chain?
k. Whether traders (wholesalers and retailers) maintain separate chains for trading organic products? If not, what do the traders face the various constraints in maintain it?
l. Is the value chain of organic FPCs under the MOVCD scheme are more organized than that of non-government-sponsored organic firms and vice versa?

1.10 Overview of the Study

With the above-mentioned research queries under consideration, this study aims to achieve the following five objectives:

(i) To identify the network structure of the value chain of selected organic crops in Assam.

(ii) To examine the value addition at each phase by all chain actors.

(iii) To identify and examine various constraints and opportunities for upgrading the value chain of the selected organic crop.

(iv) To analyse the governance and institutional features of the value chain.

(v) To make a comparative analysis of the value chain of government and non-government-sponsored organic firms.

The first chapter discusses a brief overview of organic agriculture (definitions, evolution, and development of research institution), and the scenario of the organic food market in global, national, and in context from Assam. It further discusses the value chain analysis, and value chain of organic crops and finally presents the problem statement, research queries, and overview of the study.

Chapter two starts with a review of available literature related to the value chain, value chain models, and value chain analysis of various organic/ non-organic agricultural/horticultural crops in India and Northeast India. A systematic mapping approach with the application of VOS viewer software is used to map and review the literature related to the organic food value chain for the period of 1990 to 2023. The chapter also reports the research gaps in the study. Lastly, as COVID-19 has had a severe impact on the agri-food chain, this chapter adds a special chapter on the themes of research published during the pandemic related to the supply chain area.

The third chapter presents the methodology design of the study to achieve its objective. A brief overview of tools used, variables considered, research design, data collection, and analysis techniques are discussed.

Chapter four discusses the socio-economic dimensions of the farmers, network structure of the value chain (product and service flow), price spread of organic pineapple, organic pumpkin, organic non-basmati rice, organic red rice and organic turmeric.

Chapter five discusses the degree of value addition, marketing margin, marketing efficiency, value-adding activities, value chain upgradation, and awareness of technological upgradation for five selected organic crops. In addition to this, the cost of cultivation and farmer's income are computed using ABC cost measures for this selected crop.

Chapter six focuses on identifying of various constraints faced by the farmers, commission agents, wholesalers, and retailers in the five selected organic crop value chains. This chapter also discusses opportunities for upgrading the value chains for the selected organic crops.

Chapter seven discusses the governance structure of the value chain of five organic crops.

Chapter eight discusses the comparative analysis of government and non-government-sponsored organic farms in Assam.

Finally, the chapter nine discusses the major findings, recommendations, suggestions, and implications for future research. The conclusion from the present study is also drawn and discussed in this chapter.

1.11 Chapter Summary

The present chapter briefly summarizes the background, history of organic agriculture, and present scenario of the organic food market from global and Indian contexts. The study further discusses the concept of value chain analysis and the scenario of the value chain of organic produce in India and finally presents the statement of the problem, and research queries with an overview of the study. The next chapter (chapter two) is the literature review chapter, which presents a review of various literature related to the value chain analysis of organic crops.