THE TRANSFORMATION OF AGRICULTURAL LAND IN HARYANA AND ITS IMPACT ON RURAL DEVELOPMENT

Thesis

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By

PARDEEP RATHEE

(Registration No. 41700131)

Supervised By: **DR. SAJAD NABI DAR**

LOVELY PROFESSIONAL UNIVERSITY

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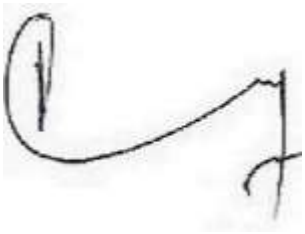
DECLARATION

I, **Pardeep Rathee** hereby declare that thesis, entitled '**The Transformation of Agricultural Land in Haryana and Its Impact on Rural Development'** is the outcome of my own research work and it did not contain any material which was published by any other person or any institute. I am submitted this thesis for the degree of **Doctor of Philosophy (Ph.D.).**

Pardeep Rathee
Ph.D. Research Scholar
Department of Geography
Lovely Professional University
Jalandhar, Punjab.
Registration No. 41700131

CERTIFICATE

Certified that this work entitled '**The Transformation of Agricultural Land in Haryana and Its Impact on Rural Development'** is the original research carried out by **Mr. Pardeep Rathee** (**Registration No. 41700131**), **Ph.D. Research Scholar** in **Department of Geography, Lovely Professional University, Punjab.** This work has been carried out under my supervision and has not been submitted anywhere else and is being submitted for the first time to the **Lovely Professional University.** The candidate has fulfilled all the statutory requirements for the submission of the Ph.D. thesis.



Signature of Supervisor

Dr. Sajad Nabi Dar
Assistant Professor
Department of Geography
Lovely Professional University, Punjab

ABSTRACT

India's rural areas have a population of roughly “12 per cent of the world's total, making them larger than Europe. 833.5 million people, or 69 per cent of the total population, still live in rural areas in India, making it one of the most rural countries globally (Ohlan, Ramphul, 2016). A large portion of the population lives in rural areas. Still, they contribute a disproportionately small share of gross domestic product. They have poor growth metrics, such as a decrease in human development index and life span in Indian states with every increase in the rural population and a lack of access to education”. Similarly, rurality is associated with higher rates of infant mortality, low-quality pregnancies, and a population living below the federal poverty line and at risk of starvation.

India is primarily an agricultural country and their basic livelihood is farming. As far as development methods, social alliances and political arrangements are concerned, the rural sector is in a challenging and abandoned to a large extent. Moreover, the gap between the availability of technological innovations in the agricultural sector has expanded between the rich and the poor, as the wealthier farmers, relative to the small ones, earn a significant share of new agricultural technology.

In rural areas, farmers are heading toward non-agricultural practices because of a lack of revenue. The 12th Plan’s key objective is to encourage farmers so that they can improve the potential of small farms by increasing knowledge connectivity, increasing investment opportunities. MGNREGA provides the wage, guaranteed for 100 days and the National Rural Livelihoods Mission (NRLM) aims to create sustainable livelihoods for the poor (BPL) by enabling them in their federation’s Self-Help Groups (SHGs) and manufacturing. These two important government schemes are concentrated for rural development initiatives mainly in the field of agriculture. Still there are lot of problems which were faced by the farmers like poor supply of water, uneven climatic conditions and poor management of crops.

Rural growth is mostly reflected in the economic understanding of how to ensure a complex shift in the economic welfare of individuals in rural areas. Even though any business activity in rural regions can contribute to rural livelihoods, the four main divisions of agriculture can be divided into Farming is likely to be the primary economic entity determining the development of rural development in states where farmers employ or more half of the population. A rapid and erroneous reduction in employment could devastate the agricultural labour force and their dependents, causing social and political unrest. Thanks to the agriculture sector, economic activity in supply and distribution networks and professional associations are generated

throughout each region. The overall rural economy, including administrations such as drug care, schooling and the critical structure, will rely on the competitiveness of the division, if agriculture is the main economic activity. Agriculture was possibly one of the narrow spaces of economic exercises imaginable to preserve the economic suitability of the district in distant and peripheral areas where civilization has recognized an honest desire for kindness to fight depopulation. In general, governments adopt agricultural policies with the goal of achieving a particular outcome in themarkets for domestic agricultural goods. The outcomes may include a guaranteed level of production, price stability, commodity efficiency, choice of goods, land use or jobs, for example. This study is significant as it explores the transformation of agricultural land in the state of Haryana starting from 1966 to 2018 and it analyzes situation of agriculture in Haryana in terms of productivity and cropping pattern development. In addition, the study also finds the impact of the agricultural and rural development on micro level with case studies of some selected sample villages and explores the major policies, programs for the upliftment of agricultural and rural development in the study area. The research has aims at studying the transformation of agricultural land from past to present to assess the impacts on rural development.

The research tests and analyses the model and scale of rural development at the state level and for the nation in general during the period from 2001 to 2011. In order to allow for a full assessment, structures of metrics relating to various facets of social progress have been set up. The study reveals that during the decade of remarkable economic growth, rural Haryana experienced a major transformation. In addition, the rural transition witnessed in Haryana was followed by an increase in rural development levels. In particular, rural Haryana has made tremendous progress in rising the degree of demand, crop intensity, and adoption of high-value crops, per capita agricultural production and education levels. However, with rapid industrialization and urbanization, changes in rural transformation have not kept pace.

The study measures and analyses the model and scale of rural agricultural transition at the state level and for the country in general during the 2008–2018, time frame. In order to make an appraisal of agriculture, indicator structures relating to the various facets of social change have been set up. In addition, the agricultural land transition witnessed in Indian rural areas has been followed by an increase in the pace of rural production. There have been notable improvements in Haryana (India) rural areas, particularly when it comes to boosting food intake, crop productivity, and promotion of high-value crops. The research was conducted using MS-Excel spreadsheets and SPSS statistical software. Frequency analysis and percentage were the statistical methods employed in the study to reach an accurate result based on the data obtained through structured interview schedules during formal interviews. Content analysis techniques

were also utilized to assess primary and secondary data.

Our study looks at how Haryana's rural agriculture has changed over 15 years, starting in 2001 and concluding in 2018. India's economy has grown at a compound annual growth rate of 8.96 per cent for the period specified. Based on the region's strategic position and the knowledge of its people, who have repeatedly weathered disasters like droughts, famines, and other afflictions, Haryana has a great history of sustainable farming prosperity. The extant archaeological and literary evidence for Haryana's agricultural history merely hint at the massive gaps that historians still need to fill. Despite recent industrial development, Haryana is a predominantly rural province. "About 70 per cent of people are interested in cultivation. Haryana is in second place in the country's food-grain production. The main crops include wheat and rice in food production, Haryana is self- sufficient and the second largest contributor to India's central food grain pool. Wheat, rice, sugarcane, cotton, oilseeds, barley, maize, millet etc. are the major crops of Haryana. In Haryana, two major types of crops exist: Rabi and Kharif. Rice, jawar, bajra, maize, cotton, jute, sugarcane, sesame and groundnut are Haryana's main Kharif crops. The soil is prepared in April and May for these crops and the seeds are sown at the beginning of rainfall in June. At the start of November, the crops are primed for harvesting. Wheat, tobacco, gramme, linseed, rapeseed and mustard are the primary Rabi crops. By the end of October or the beginning of November, the soil is prepared and the crops are harvested by March. Owing tothe various challenges facing rural areas, the need for rural growth is becoming more critical due to inadequate service resources and a shortage of creative advances. In rural areas, basic facilities such as safe drinking water, essential health, education and road transport facilities must at least be developed. The shortage of these important services isolates the mainland rural population. In developing more complexities to consider the socio-economic aspects of rural transition in India, the study is useful. The findings should help to establish strategies to resolve the distributive justice problems of the rural-urban fruits of economic development. Here, this study is significant as it explores the transformation of agricultural land in the state of Haryana starting from 1966 to 2018 and it analyzes situation of agriculture in Haryana in terms of productivity and cropping pattern development. In addition, the study also finds the impact of the agricultural and rural development on micro level with case studies of some selected sample villages and explores the major policies, programs of agricultural and rural development in the study area with impact of its implementation.

The objectives of the thesis are: -

1. To explore the transformation of agricultural land in the state of Haryana starting from 1966 to 2018.
2. To analyze the present situation of agriculture in Haryana in terms of productivity and cropping pattern.
3. To investigate the agricultural and rural development on micro level through case studies of some selected villages.
4. To explore the Government policies, programs for development of agricultural and rural development and assess its impact in terms of execution.

Haryana's rural transition is largely distinguished by increased rural socio-economic growth and enhanced infrastructural facilities, both of which have substantially improved the standard of life in rural areas. To sum-ups, Haryana's strong economic growth has resulted in major changes in both rural transition and rural production. Rural India, on the other side, tends to lag behind urban regions. According to policy assumptions, rural areas should receive more attention to reduce the urban-rural divide. More forceful interventions are needed to reverse the urban-rural range, such as improved rural sanitation facilities, irrigation intensity, and technical services from business and city centers to agriculture and rural areas, to name a few. We determined which variables had the most significant impact on the land's change using this information. There was a significant land-use differences for all variables (agricultural farm revenue, gender ratio, literacy among women, rural economic growth, and infrastructural service development). So, we concluded that all variables had significant effect on the land transformation. After Green Revolution the agriculture sector shoots up rapidly initially but the total area under agriculture in Haryana has decreased after the decades of 1960s. Since 1966-67 to 2017-18. The net area land for agricultural used decreased whereas use of land in non-agriculture was also decreased gradually. Similarly, the forest land also decreased. From the objective one explores the transformation of agricultural land in the state of Haryana Starting from 1966 To 2018, For this, only the land use pattern of Haryana such as forest, baren land, and agricultural land has been changed regularly in statistical abstract of Haryana, the land use pattern and the crops pattern have been taken. If the districts keep changing every decade, then the district which included in the district from which it is formed continuously rural zone converting to urban zone under change in land use: here we have studied the change in agricultural land (increase or decrease) that in which category it is getting transformed along with the intensity of this change. In this, we have seen that various changes in agricultural land

have reduced or more, the land which has been reduced to agriculture, where it has gone, in the built-up area or in the forest reduces. From objective 2, analyzed the present situation of agriculture in Haryana in terms of its productivity and cropping pattern. We have found that demarcation of the agro-climatic zones of Haryana: here the state of Haryana will be divided into three agro-climatic zones based on few earlier studies and agricultural and climatic characteristics. The agro climatic zone indicator is from the cone, how many zones Haryana is divided into and on which base, comparative study of these zones: here a comparison of the level of agricultural development among these zones will be made. This comparison shall be focused on irrigation intensity, cropping intensity, production of different crops, yield, agricultural productivity etc. Now under the third objective to explored the impact the agricultural and rural development at micro level with case studies of some sampled villages with 286 respondent interviews this was given in finding section in more detailed. The fourth objective is to explore the Implementation and Impact of Major Policies, Programs of Agricultural and Rural Development. It describes the main policy configurations and provides summary indicators to quantify policy efforts. Evaluate policies based on their ability to achieve sustainable productivity growth and food security, and suggest ways to improve policy performance as needed".

The last chapter gives the descriptions of all the chapters and analyzed the results to show future research.

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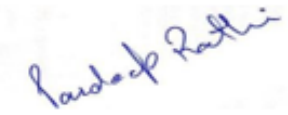

Pardeep Rathee

DEDICATED

TO

MY FATHER

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH FRAMEWORK

India is a rural country, of which 833.5 million people (which approximately "comprises 69 percent of the total India's population) still reside in rural areas. According to the 2011 census, the rural population of India accounts for twelve per cent of the total population of the world, which is larger than that of Europe. The rural population is mainly involved in agriculture & allied familiar sector operations, but the proportion of income (and contribution) in GDP is too low, and is also characterized by low value in different growth indicators, such as the human development index and life expectancy will decline (UNDP, 2018). Similarly, rural areas are directly related to infant mortality, unhealthy births, population below the poverty line, and hunger index (UNICEF, 2020).

The majority of India's rural population's livelihood is dependent upon agriculture, as nearly two-thirds of its population relies on agriculture. This sector is still in the developing stage in India, along with a few other developing countries, a number of developing concerns in this sector, India continues to face. The contribution of Agriculture's production proportion to GDP has gradually dropped from 1951 to 2011, as the result of expansion and rise of Indian economy. Despite reaching self-sufficiency of production of food, India still holds a one-fourth of the world's hungry people and over 19 crore undernourished people. Poverty is currently estimated to be affecting almost 30 per cent of the population. Global Nutrition Report, 2016 reports that India in terms of under-5 stunting ranks 114th out of 132, 120th among 130 countries in terms of under-5 wasting, and 170th out of 185 countries related to prevalence of anaemia. Anemia continues to affect 50 per cent of women in the country continue to be affected by Anaemia, including women who are pregnant, and comprise 60 per cent of children. (Government of India, 2008, (FAO, 2019))". Agriculture, forestry, fishing and hunting, remains the biggest field of the Indian economy as a means of livelihood.

Our agriculture contains many inherited and sustainable practices that have been passed down from generation to generation. For many Indians agriculture is not an occupation, it's a way of life. As a result, the current generation needs to be familiar with the traditional technology of our historical and traditional agricultural systems. India has made remarkable progress in agriculture and related industries, but with a focus on intensive use of inputs without considering their

adverse effects, generated many problem (NAU, 2019). This also allows to the present generation to create future research topics.

The Green Revolution was initiated in India in the late 1960s and after that the growth of economy of the country was boosted up. The farmers of the country started using high yield variety seeds to increase the crop production. In the mid-1990s, farmers started to focus on small commercial crop due to many factors such as diminishing farm sizes, fluctuating prices, demands for livelihoods and lack of work in the high agricultural season (Sebby, 2010). During that time the food and nutritional welfare of many poor farmers family have been seriously damaged.

India has done well in the post-change era (since 1991) on a few metrics, such as economic development, external dispatches, payment adjustment, flexibility to external goods, development in the service sector, impressive set of external trade, information technology (IT) and securities trading, upgrades in broadcast communications etc. (Centre for Civil Society, 2020).

After 1991, economic reforms and regulatory approaches have been introduced in India, initially focusing on manufacturing, telecommunication sector, civil aviation, finance and capital markets. This economic reform was absent in informal sectors like street vendors, rikshaw pullers and specially the agricultural sector.

The Government of India, has made a declaration to double the income of farmers by 2022. The decisions and processes for achieving this timely aim are judged by experts. One of the alternatives is to determine the potential to increase the income of farm families within the fair era of the age-old organized cultivation system (Kotadiya, 2021).

1.2 TRANSFORMATION OF AGRICULTURAL LAND FROM ANCIENT TO MODERN AGE IN HARYANA

After creating agriculture, Neolithic man established a foot-hold in the forests and learnt to manipulate and use fire. He invented the wheel, the iron, axe, ploughshare, and animal power to dwell in designated regions, form a group, cultivate a substantial amount of his food near jungles and plant crops. The Chalcolithic period saw the development of simple farming methods. The move from cereal-fallow shifting farming to nomadic shifting cultivation resulted from this transition. Irrigated agriculture has been mastered. Ponds are used to retain rain and floodwater for irrigation reasons. The increase in food production that has come about due to technical advancements has helped feed the growing population. Humans discovered that raising tamed

animals and cultivating crops could supplement their limited physical capabilities, allowing them to create the first foundations of what is now known as a civilization in their spare time (GIAHS, 2021).

Sustainable agricultural expansion in Haryana dates back hundreds of years thanks to its strategic point and the region's inhabitants, who have persevered in the face of several natural and induced disasters, such as drought and famine alike. There is a large vacuum in the Haryana agricultural background, which historians must address. Researchers determined that a village in the Hisar region of Haryana, India, known as 'Siswal', was the earliest settlement dominated by agrarian societies as early as 2500 BC, thanks to extensive excavation and exploration. The emergence of the Harappan civilization marked the beginning of a tremendous cultural and agricultural epoch. An agricultural foundation for the Harappa civilization has been discovered through excavations at sites like Siswal and Mitathal and Rakhigarhi and Banawali. Haryana's agrarian history has been broken down into the three well-known periods of Indian history: prehistoric, mediaeval, and modern eras (HARYANA STATE GAZETTEER, 2021).

1.3 AGRICULTURAL AND RURAL DEVELOPMENT IN INDIA

As India is a rural country, India is home to two-thirds of its inhabitants. Rural people are growing at the same rate as the overall population of the country (Arora & et al., 2021). According to the official figures, “registrar and Census Commissioner C Chandramouli said that the rural and urban distributions are 69 per cent and 30 per cent respectively. The proportion of people living in rural areas dropped from 72.19 per cent in 2002 to 68.84 per cent in 2010, as urban population grew from 27.81 per cent to 31.16 per cent. In 2010, the overall literacy rate in India was 74 per cent, with men accounting for 82 per cent of the total and women holding for 66 per cent of the total (CENSUS, 2011). But the majority of the population has been living a troubled life, owing to the agricultural sector lacking job opportunities due to India’s rapidly developing population. Rural growth is becoming more critical in the Indian ecosystem for two vital reasons. First the agricultural sector mainly depends on seasons and second, the rural sector being backward is a significant barrier to the general development of the Indian economy.

India is primarily an agricultural-based country and their basic livelihood is farming. As far as development methods, social alliances and political arrangements are concerned, the alleviation of the rural sector is challenging and moreover abandoned to a large extent. The gap between the availability of technological innovations in the agricultural sector has expanded between the rich and the poor, as the wealthier farmers, relative to the small ones, earn a significant share of new

agricultural technology (Gangopadhyay, Mukhopadhyay, & Singh, 2008).

As shown in the 2011, Programme Evaluation Report (Planning Commission, Government of India,) the total rural population of the country is 83.25 crore (68.8 per cent of the total population) (Planning Commission, 2013). A general consensus has been reached that rural development should be inclusive and sustainable in order to reduce poverty. The provisional Gross Budgetary Support (GBS) for the 12th Five Year Plan (2012-17) for the Ministry of Rural Development is Rs. 44,3261 crores (against the 11th Plan period Rs. 29,1682 crores) which includes in the main programs. Despite the fact that agriculture currently accounts for just 23 per cent of the Gross Domestic Product (GDP), it is still the primary source of livelihood for the majority of the rural population. Within the rural sector, important additional reforms are taking place and there are strong signs of increased implementation in this respect". Compared to the 10th Plan, agricultural development has improved and the progress continues in this respect.

Table 1.1 Agriculture and associated sectors growth

Five Year Plan	Share of Agriculture in the Economy (in %)	Growth Rate of Agriculture and Allied Sectors (in %) (All figures based on 2004-05 prices)	Growth Rate of Total Economy (in %)
Ninth Five year Plan	23.4	2.5	5.7
Tenth Five Year Plan	19.0	2.4	7.6
Eleventh Five Year Plan	16.8	5.8	9.3
2007-08	15.8	0.1	6.7
2008-09	14.6	0.8	8.6
2009-10	14.5	7.9	9.3
2010-11 (2nd RE)	14.1	3.6	6.2
2011-12 (Rev Est)	15.2	3.7	8.0

Source: Central Statistical Office, New Delhi, 2013

Nowadays in rural areas, farmers are heading toward non-agricultural practices because of a lack of revenue. The 12th Plan's key objective is to encourage farmers so that they improve the potential of small farms by increasing knowledge, connectivity for markets, and increase investment opportunities. MGNREGA provides the wage company and the National Rural

Livelihoods Mission (NRLM) aims to create sustainable livelihoods for the poor (BPL) by enabling them in their federation's Self-Help Groups (SHGs) and manufacturing (Minister of Rural Development, 2013).

1.3.1 HISTORICAL DEVELOPMENT IN HARYANA

Almost two decades of nonviolent resistance by the people of Haryana led to the creation of the new state of Haryana on November 1, 1966, as a result of the partition of Punjab. As part of Punjab, Haryana remained an underdeveloped region even after gaining independence in 1947. It was not given its fair share of development plans, programmes, utilities, agriculture, irrigation, and other resources. New growth and stability have been ushered in by Haryana State's distinct political identity due to improved agricultural productivity in the region (Haryana State Gazetteer, 2020).

First, as part of Punjab then as an independent state, Haryana has passed and adopted legislative acts regularly. Legal actions relating to land reform in Punjab were enacted in 1954, 1956, 1958, and several other years. The Haryana Ceiling on Property Holdings Act of 1972 was created to unify the state's land ownership restrictions legislation (Planning Commission, 1966).

From being a state with food deficit in 1966 when it was formed, Haryana has been a pivotal contributor to its food grain pool. The exponential increase in agricultural output in Haryana was extraordinary in scope. As a result, it has contributed much to the state's varied political leadership, innovative scientific and technological advancements in agriculture and land reforms, large aid from the central government and efficient infrastructure (Haryana State Gazetteer, 2020).

Since the country's independence, there have been significant advancements in nearly every aspect of agriculture in India. To feed the country's growing population, attempts have been devoted to enhancing agricultural productivity and putting more land under cultivation for agriculture. There has been an increase in the farming sector's net sown area, irrigated area, and crop yields. Profits per hectare have also increased significantly, for the farmers. The government has enacted new land reforms, agricultural programmes, and agricultural strategies periodically to advance the agricultural sector. Steps have been taken to abolish the intermediary structure between both the state and the farmers, to protect tenure, to ensure that cultivator's possession of the land was assured, to put a cap on agricultural landholdings and to redistribute land for the use of new agricultural practices (Sharma, 2021).

Public institutions and their linkages to political processes have consolidated their grasp and

position simultaneously as these advances. Small and marginal manufacturers like farmers, women, and rural craftspeople have a low financial situation that doesn't allow for much room for creativity to thrive. There is a rapid increase in small and marginal agricultural jobs, skilled women, and unemployed youth in Haryana, even though there has been much progress in agriculture. This is due to population growth, fragmentation of holdings, higher life expectancy, education, and other socio-economic factors (Haryana State Gazetteer, 2020).

Agricultural expansion has led to a social and cultural shift in the population of Haryana since the state's inception. Their impact on people's standard of living may be seen in the Green Revolution and agrarian reform. In Haryana's culture, some discrepancies still arise as economic growth progresses. Compared to small-scale farmers in Haryana, big farm owners have greater access to digital information and technology and more financial ability to adopt modern inputs. As new developments are introduced, they can expand their operational holdings. This group of people is usually well-educated, well-trained, and has easy access to the benefits of development organizations and political leaders.

India's Green Revolution introduced new agriculture technologies, which enhanced agricultural production and it also show some negative aspects like as long-term soil fertility loss, widespread plant genetic variety loss, increased pesticide danger, and the environment are only a few consequences. "The policies and practices of Government and practices in rural techno-infrastructure advancement such as highways, irrigation, electricity and other modes of supply, utilities and marketplaces for agricultural growth were implemented after independence. Land reform, remunerative pricing policies, credit availability, and several different forms of support for small and marginal farmers were made possible thanks to policy and regulatory involvement. Farmers have become self-sufficient in food grains thanks to new agricultural technology, resources, and public policy (Nelson, Ravichandran, & Antony, 2019).

1.4 STUDY AREA

India ranks as the second-most populous country in the world, having a population of 1.27 billion with an area of 3,288,000 square kilometers, it is the sixth-largest country in the world. The coastline stretches nearly 7,500 kilometers. India is a diverse country which has more than 22 major languages and 415 dialects. The country is blessed with a variety of agroecosystems, including the Himalayas to the north, the Thar Desert in the west, the Ganges Delta to the east, and the Deccan Plateau to the south. India produces the most milk, legumes and Jutes in the world, and the second most common rice, wheat, sugar cane, peanuts, vegetables, fruits and

cotton (FAO, 2019).

On November 1, 1966, the state of Haryana was added to India's political landscape. The region has long been considered the cradle of Indian civilization and agriculture, dating back to prehistoric times. This region had long relied on livestock farming as its primary source of income, dating back to the second millennium BC when the Aryans first arrived. The Rigveda, the oldest known Aryan text, was penned. As the Saraswati River ran through this area, it was considered the heart and soul of the Aryans. An essential part of India's economic development and agricultural output, the region has played a significant role from ancient times. The Vaman-Purana is the first literary reference to agriculture in this region, even though archaeological evidence suggests farming was practised here before the Harappan period (Haryana State Gazetteer, 2020).

The Shivalik Hills in the north, the Aravalli Hills in the south, the Yamuna River in the east, and the Thar desert in the west encircle Haryana. Between 27° 3' north and 31° 9' north, and 70° 5' east and 77˚ 6' east, the state of Haryana in northern India connects Delhi. Haryana has an area of 44,222 square kilometers. The ground slopes northward to southward. 700-950 feet above MSL is considered the norm for geological altitude (Kumar S., 2011). Located in the Sirsa, Hisar, Bhiwani, and Mahenderagarh districts of Haryana, the Thar desert is part of the state". Kayak-vana, Aditya-Vana, Phalke-Vana, Vyas-Vana and Surya-Vana are seven Vanas (forests) mentioned in the Vaman Puran, located in the Haryana districts of the Indian subcontinent. The seven rivers that flow through this district are Saraswati, Drisadawatis Vaitarinis Apayas, Amshumatis Hirnnyawati and Kaushiki (GOI, 2021).

Map1.1 Political Map of Haryana

Source: Haryana Space Application Centre, 2021

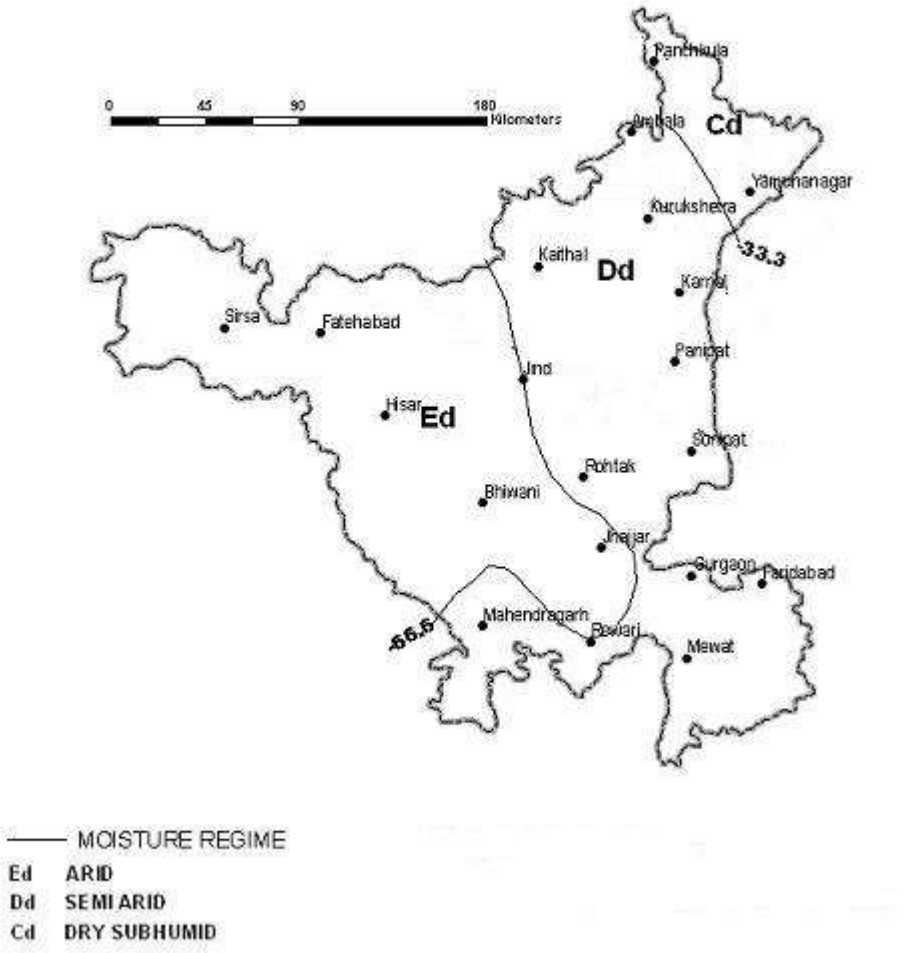
Haryana state has 22 districts, 6 divisions, 74 sub divisions, 94 tehsils, 49 sub-tehsils and 142 blocks. Total towns according to the 2011 census is 154 with total villages are 6841. Total population of the state is 253.41 lakh with 134.95 lakh (53 per cent) males and 118.56 lakh (46 per cent) females. Rural population is 165 lakh and urban population is 88 lakhs only. The total literacy rate of the Haryana state is 75.6 per centage with 84 per cent for male literacy and 65 per centage for female literacy (GOI, 2021).

The Imperial Gazetteer of India reports that, from Harialban or the land of green forests, the term Haryana is most likely derived and is important of the old days when this region was a rich and productive area. In view of the critical region of the district and the shrewdness of its relatives, Haryana has a rich history of feasible agricultural development, which has faced numerous natural and anthropogenic disasters, such as dry spells, poverty and various problems (Haryana State Gazetteer, 2020).

1.4.1 AGROCLIMATIC ZONES OF HARYANA

The climatic conditions of Haryana depend mainly on its geographical location in the northwest of the Indian subcontinent, about 1,600 kilometers from the Bay of Bengal, sandwiched between the western Himalayas in the north and the Thar desert in the south. Environment is one of the most significant agricultural opportunities that haven't been completely used to improve production. Variations in temperature from year to year, as well as drastic departures from usual weather conditions, have harmful effects on crops and hold food production extremely fluctuating. Insufficient rainfall, excessive and untimely rainfall, heat waves, cold waves, strong and humid summer monsoon (locally called loo), sandstorms, fog, ice and hail are all major weather anomalies that have a negative impact on crop growth in the state of Haryana. Its climate is dominated by cold monsoons from the northwest and southwest. From July to September, only the tail of the summer monsoon depression was received. In the western region of Haryana State, rainfall during the monsoon season is erratic and minimal (250,500 mm over 10-20 rainy days), with prolonged droughts, staggered starts, and early setbacks. In the kharif season, the coefficient of difference is about 50 per cent, and in the rabi season, it is nearly 100 per cent. In both seasons, there are differing degrees of moisture tension. With an Aridity Index > 0.66, potential evapotranspiration is about 1500- 1650 mm per year. In Haryana's Eastern Zone during the monsoon season, rainfall ranges from 500 to 1200 mm in 40 to 45 days. Moisture surplus in the kharif season, but heavy moisture stress in the rabi season. Evapotranspiration is estimated to be between 1250 and 1350 mm per year (The Weather Channel, 2020).

Map 1.2 Agroclimatic Zones of Haryana



Source: Haryana Space Application Centre

1.4.2 CAUSE OF AGRO CLIMATIC CHANGE IN HARYANA

During the Kharif season, temperatures in the southwest range from 32°C to 29°C, with the northern portions experiencing lower temperatures. And during the Rabi season, the country's average temperature is 15 degrees Celsius in the north and 20 degrees Celsius in the southwest. During the warm months (May/June), temperatures can reach 48°C, while night temperatures can fall to 0°C (December to February). The southwest of the state of Haryana is arid and semi-arid, while the entire state is tropical and sub-humid. The temperature in Zones I, II, and III range from 24°C to over 25°C on an annual basis.

There is a 25 to 45 per cent coefficient of variation in the state's annual rainfall, ranging from under 400 mm in the southwest to 1200 mm in the northeast. More than 80 per cent of this rain falls during the monsoon season (July to September), which coincided with the growing season of Kharif crops. On average, the SW area receives around 300 mm of rain, while the northernmost part receives over 750 mm, with a difference of between 45 and 55 per cent. The rabi crop growth season occurs during October and March, when only 10 to 15 per cent of the yearly rainfall falls. Rabi crop sowing is possible in locations with significant soil moisture storage and high rainfall further in the monsoon season in areas where rainfed agriculture is mainly carried out during the monsoon season.

India's agro-climatic areas are depicted in Map 1.2. Haryana's climatic areas can be classified into three climatic zones dependent on Thornthwaite's classification: arid, semi- arid, and dry sub-humid

This zone includes the Siwalik Hill district, which receives a lot of rain and includes the areasof Kalka, Nariangarh, and Chhachharauli. Wheat and paddy are grown under irrigated conditions in this district, while maize, gramme, and wheat are grown under rainfed conditions.

Significance of Agro ecological zoning: It allows for the calculation of genotype yield capacity. It is necessary to allow effective use of soil and bioclimatic tools. Aids in technological conversion from one country to another. It aids in the process of double cropping. It allows for the introduction of new genotypes into an area. It is possible to define restrictions that restrict crop development.

1.5 AGRICULTURAL SCENARIO IN HARYANA

Haryana is proudly known as Bread Basket of India and it has witnessed a significant growth in agriculture sector over the past years (Singh & et al, 2020). The agricultural sector in Haryana is considered to be very rich if compared to the other states of India. Nearly 75 per cent of the total procurement of rice and wheat by government was from Punjab and Haryana (Radhakrishnan, 2020). After Haryana became a food shortage state when it was established in 1966, it became a major sponsor of the National Grain Reserve. Overall, thanks to the country's diverse political leadership, current science and technology, agricultural organizations, land reform, flexible support from the central government, strong structure, improved food varieties, and progress in production, Agricultural production has experienced surprising growth ((UNCTAD, 2017).

Agriculture has continued to grow Haryana's economy though witnessing numerous changes in the midst of the last three decades. The largest transition came in the mid-1960s with the Green

Revolution that generously expanded the yield and its benefits would certainly stream down to all of the rural society's sector. In the aftermath of the introduction of modern agricultural methods, The agrarian economy of Haryana, with an unusually changed agricultural base, started to weaken for just three decades. The agriculture sector has been a reliable and important supporter of the Gross State Domestic Product (GSDP) immediately, considering the fact that the supply of this sector to the Gross State Domestic Product is slowly decreasing. The portion of Gross State Domestic Product shows that the supply of agricultural and partnered industries dropped from 32.0 per cent in 1999-2000 to 20.5 per cent in 2007-08. In the State GDP, it declined further to 16.7 per cent (at consistent costs for 2004-05) and 19.5 per cent (at present costs) in mid-2010-11 (Economic Survey Haryana, 2010-11).

It is estimated that almost 67 per cent of Haryana's 16 lakh landholdings are small and marginal, with only 3 per cent being significant. As per the census 2011, the state of Haryana has an average holding size of 2.25 hectares, which is 1.1 per cent larger than the national rate of 1.15 hectares. Crop season adjustments, temperature changes, increase in water supply for agriculture irrigation and groundwater consumption, reduced organic soil carbon, and various plant nutrients have affected crop productivity for farmers in the ten selected districts of Haryana. Wheat, rice, and maize yield gaps and management yield gaps (crop loss owing to inadequate management in farmers' fields) have been found.

On community land, the scaled-up effort promotes sustainable farming practices in model fields, such as zero-tillage farming; raised bed planting; direct-planted rice; alternating rice soaking and drying; and management/protection of crop residue. Fertilizer application on a site-by-site basis and precise control of water resources (laser levelling) Weather-driven seed and food banks with added value; capacity development; ICT-based guidance and capacity building; and information exchange are examples of this approach.

The introduction of these extensive climate-smart agriculture activities in the state will also raise severe national issues, which must be addressed. Many hurdles to doubling the income of farmers in India by 2022 include the need for a better understanding of handling temperature-sensitive agricultural products, as well as low-quality cold chain facilities, the need for suitable integrated agricultural aggregation facilities, and post-harvest storage facilities, as outlined in a Government of India's Department of Administrative Reforms & Public Complaints (DARPC) History Paper (2017). (Chand, 2017).

Although one of the world's principal farming regions, India's share in the global food store is less than 2 per cent. There are several nations in the world whose crop yields per hectare are higher than India's in varieties such as paddy, wheat, maize, pulses, and so on, including the

United States and France (FAO, 2019).

1.6 LAND USE PATTERN OF HARYANA

Agricultural land use refers to the important use of geographical areas for diverse uses and practices (Kanianska, 2016). "The greater scale of the net sown area of the aggregate geographical area, the greater the volume of agricultural production (Dayal, 1984). The land use analysis is an integral part of geographical investigations and offers legal guidelines for territorial organization and development, as well as for the potential implementation of agriculture. In this way, several experts and geographers have concluded the investigation of land usage and its modification at national and universal stages. The state of Haryana occupies 1.44 per cent of the country's geographical area (Kumar S. , 2020). It is situated in the northwest region of India and is region of the plain of Indo-Gangtic. It shares borders in the north with Himachal Pradesh, in the east with Uttar Pradesh and Delhi, and in the northwest with Punjab and Chandigarh.

Table 1.2: Agriculture Classification of Area in Haryana State, per centage of Area under different Land use

Years	Fallow Land (per cent)	Other uncultivated land excluding Fallow Land (per cent)	Land not available for Cultivation (per cent)	Total area according to village papers (000 hectares)
1966-67	83.70	3.11	13.18	4,399
1970-71	81.53	2.04	16.43	4,802
1975-76	85.13	1.77	13.10	4,404
1980-81	85.79	1.36	12.85	4,405
1985-86	86.11	1.18	12.71	4,391
1990-91	85.52	1.10	13.39	4,378
1995-96	85.08	1.18	13.73	4,398
2000-01	85.37	1.34	13.29	4,402
2005-06	85.57	1.56	12.88	4,372
2006-07	84.74	2.38	12.88	4,372
2007-08	84.77	1.51	13.72	4,372
2008-09	84.33	1.67	14.00	4,371
2009-10	84.37	1.58	14.05	4,371
2010-11	83.36	1.46	15.17	4,370
2011-12	83.78	1.46	14.76	4,371
2012-13	83.14	1.28	15.63	4371
2013-14	82.82	1.14	16.04	4,371

2014-15	83.05	1.24	15.72	4,371
2015-16	83.20	1.33	15.48	4,374
2016-17	84.63	1.56	13.82	4,372
2017-18	84.51	1.81	13.68	4,371

Source: Statistical abstract of Haryana 1966-67 to 2017-18

The current table is an attempt to examine the agriculture classification of area in Haryana state, percentage of area under different land use improvements that took place in Haryana's land use model from 1966 to 2018. The analysis indicates that marginal improvements have arisen in all categories of property use; property, with the exception of the proportion of woodland area that has decreased dramatically from 2.575 per cent in 2015-16 to 1.02 per cent in 2016-17.The proportion of net area cultivated in the overall area fell marginally from 82.1 per cent in 2015-16 to 80.16 per cent in 2016-17, although there were positive improvements in the area which were under non-agricultural usage that increased from 8.69 per cent in 2015-16 to 10.14 per cent in 2016-17. A very relevant measure of the extent of agricultural growth and agricultural productivity is the proportion of net area (NSA). For the overall region, the proportion of NSAs decreased slightly from 82.12 per cent in 2015-16 to 80.16 per cent in 2016-17. More fertile land has been opened to construction and human settlements because of urban and industrial growth. Non-agricultural shares of the remaining districts are below the state level (10.14 per cent). This is mostly due to the rugged surface and the high proportion of forest-based areas. The districts in which the NSA per centage was lower than the state average (82.12 per cent) was Ambala, Panchkula, Yamuna Nagar, Panipat, Faridabad, Gurgaon, in much of the province, the NSA comprised 80 to 90 per cent of the total region. Because of urbanization, construction, and infrastructure work (railways, highways, industry creation). For these factors, the per centage of non-agricultural land use rose substantially from 8.69 per cent during the 2015-16 periods to 10.14 per cent during the 2016-17 periods. The proportion of the remaining land use category in the state has risen marginally.

1.7 AGRICULTURAL DEVELOPMENT AND HARYANA

Agriculture is considered to be a subject of the State, but the sector's operations in India are largely regulated by central government policies and regulations imposed by State Governments. State participation has centered largely on the production and transition and irrigation of agricultural technologies and the supply of surface irrigation and energy. The agricultural sector's policy and regulatory system is also marked by prevalent restrictions on the sale of

agricultural commodities. At the same time, however, other measures, through the distribution of substantial output incentives (irrigation, credit, and power), reward farmers and customers. Historically, such subsidies were implemented to promote and accelerated development of the agricultural sector (Ministry of Agriculture Resolution, 2004).

Haryana is primarily a farming state, notwithstanding recent industrial development. Cultivation piques the curiosity of the majority of the population, at over 70 per cent. Haryana is the second-largest producer of food grains (ICFA, 2011). Food output includes wheat and rice, and Haryana is self-sufficient and India's second-largest food grain exporter. Crops including wheat, rice and sugarcane are Haryana's economy. Rabi and Kharif are the two most common crops in Haryana. Haryana's principal Kharif crops are rice, jawar, bajra, maize, cotton, jute, sugarcane, sesame, and groundnut. Seeds for these crops are seeded in June after the soil has been prepared in April and May. The crops are ready to be harvested at the beginning of November. Rabi crops include wheat, tobacco, gramme, linseed, rapeseed, and mustard. March is when the crops are harvested after the soil is prepared in late October or early November.

1.8 SUGGESTED IMPLEMENTATION OF POLICIES, PROGRAMMES FOR AGRICULTURAL DEVELOPMENT

Following consideration of various social, economic, and environmental factors, agroecological agriculture has been implemented throughout the country. It is necessary to enforce this article by identifying an integrated set of climate-resilient technologies and practices at the farm level to manage water, resources, soil, crops, livestock, aquaculture and so on while also taking into consideration the impact of agricultural production and landscape-level ecological services (Tittonell & et al., 2020). Experts say that expanding the evidence base necessitates evaluating and applying various methodologies to determine which tactics and methods are most appropriate in each situation. There are synergies and compromises between food management, adaptation, and mitigation due to this process. Reducing poverty, job creation, rural infrastructure development, essential minimum service supply is just a few of the rural projects implemented by the Department of Rural Development through State Governments. There are various systems in place, including, DRDA Government, Training Schemes, Charitable Scheme and Social Action Program Promotion, Beneficiary Organization, Rural Technology Development and Distribution (CAPART), mechanism of monitoring implemented by the DRDA Government. Rural development programmes are an essential aspect of Haryana's ambitious growth goal. In the following decades, Haryana needs a new rural development model

for poverty reduction to recognize institutional and technological advancements and the growing importance of a narrowly organized and diversified agriculture industry. In addition, the rural poor participation of the rural poor in the development and execution of essential policies and programmes must be there to promote gender equality, the inclusivity of minorities, the participation of the weakest in markets and the accessibility of services (DRDA, 2017).

1.9 SIGNIFICANCE OF THE STUDY

Owing to the various challenges facing rural areas, the need for rural growth is becoming more critical due to inadequate service resources and a shortage of creative advances. In rural areas, basic facilities such as safe drinking water, essential health, education and road transport facilities must at least be developed. The shortage of these important services isolates the mainland rural population. The study is useful in developing more complexities to consider the socio-economic aspects of rural transition in India. The findings should help to establish strategies to resolve the distributive justice problems of the rural-urban fruits of economic development. Here, this study is significant as it explores the transformation of agricultural land in the state of Haryana starting from 1966 to 2018 and it analyzes situation of agriculture in Haryana in terms of productivity and cropping pattern development. In addition, the study also finds the impact of the agricultural and rural development on micro level with case studies of some selected sample villages and explores the major policies programs of agricultural and rural development in the study area with impact of its implementation.

1.10 STATEMENT OF RESEARCH PROBLEM

The standard holding scale is expected to be 0.32 and 0.24 ha separately in India in 2030 and 2050. On view, 63 per cent of the land is below 1 ha, representing 19 per cent of the area employed, while approximately 40 per cent of the area is represented by more than 86 per cent of belongings below 2 ha. In 2050, more than 95 per cent of the possessions were listed as small and minor owner, according to devices. India is the second largest producer of wheat and rice and the third largest producer of herbs and beets, sugar cane, root crops, tuber crops, fruits, dried natural goods, raw materials dependent on agriculture, inland fish and eggs (Kumar S. , 2020). The levels of soil organic matter are declining and the use of compound data sources is increasing, and the production of Haryana wheat and rice yield and various crops is now declining as a direct result of the low richness of soil and salt water issues, and cultivable land from the Indian point of view is decreasing trends and reflects the pressure on land to

increase yield per capital land with The condition of developing countries such as India is critical for organized land-based farming enterprises such as field and plant crops, fisheries, poultry, apiary, mushroom, sheep rearing, dairying, etc. to minimize knowledge sourcing and increase the reuse of contributions to maintain farm sustainability and productivity and decrease the impact of the green revolution. So, the problem is stated as *The Transformation of Agricultural Land in Haryana and Its Impact on Rural Development*. Therefore, the research problem for this research is that the rural development is affected by the land transformation.

1.11 OBJECTIVES OF THE STUDY

The research has aims at studying the transformation of agricultural land from past to present to assess the impacts on rural development. The main objectives of the research work are:

1. To explore the transformation of agricultural land in the state of Haryana starting from 1966 to 2018.
2. To analyze the present situation of agriculture in Haryana in terms of productivity and cropping pattern.
3. To investigate the agricultural and rural development on micro level through case studies of some selected villages.
4. To explore the Government policies, programs for development of agricultural and rural development and assess its impact in terms of execution.

1.12 NEED OF THE STUDY

The economic welfare of an individual in the rural areas is mostly shown by the economic activities of the rural region. Although any economic activity in rural areas may lead to rural growth, and the most important economic is agriculture (OECD, 2000). The basic sections of agriculture may fall into four general classifications: general jobs in agriculture are provided in irregular states, such as where farmers talk to more than half of the population, agriculture is likely to be the main economic movement deciding on the advancement of rural development. For such a considerable degree of the agricultural labour push, any solution that caused a swift and false reduction in jobs may have serious consequences for the labour force and dependents, creating social and political tremor.

The agricultural sector supports the reach of subordinate and administrative operations in each region, generating economic activity in the supply and circulation chains as well as in management companies. The overall rural economy, including administrations such as drug care,

schooling and the critical structure, will rely on the competitiveness of the division, if agriculture is the main economic activity. Agriculture was possibly one of the narrow spaces of economic exercises imaginable to preserve the economic suitability of the district in distant and peripheral areas where civilization has recognized an honest desire for kindness to fight depopulation. In general, governments adopt agricultural policies with the goal of achieving a particular outcome in the markets for domestic agricultural goods. The outcomes may include a guaranteed level of production, price stability, commodity efficiency, choice of goods, land use or jobs, for example.

The research tests and analyses the model and scale of rural development at the state level and for the nation in general during the period from 2001 to 2011. In order to allow for a full assessment, structures of metrics relating to various sides of social progress have been setup. The study reveals that during the decade of remarkable economic growth, rural Haryana experienced a major transformation. In addition, the rural transition witnessed in Haryana was followed by an increase in rural development levels. In particular, rural Haryana has made tremendous progress in rising the degree of demand, crop intensity, and adoption of high- value crops, per capita agricultural production and education levels. However, with rapid industrialization and urbanization, changes in rural transformation have not held in reserve pace.

1.13 SCOPE OF THE STUDY

The policy consequence is that there is a great deal of potential for the urban-rural divide to be bridged by more emphasis on rural areas. More powerful steps are required to reverse the pattern of urban-rural separation, such as the strengthening of the rural economy, the intensity of irrigation and technical support from industry and urban areas to agriculture and rural areas. Further measures are taken to boost communities, such as housing, economic empowerment, the strengthening of clean water, education and electricity. The cross-sector disparities between the agricultural and non-agricultural sectors in labour productivity have increased considerably.

It was addressed those regional policies specify the rural transition of forms of agriculture, which can be a successful way of bridging the divide between the country's urban and rural areas. A welcome move in this direction is the adoption of the Rurban Mission on the basis of a group of villages. The research provided evidence for other region-specific case studies to track and measure the efficacy of rural transformation of agricultural programmes.

The study measures and analyses the model and scale of rural agricultural transition at the state level and for the country in general during the 2008-2018 timeframe. In order to make an

appraisal of agriculture, indicator structures relating to the various facets of social change have been set up. In addition, the agricultural land transition witnessed in Indian rural areas has been followed by an increase in the pace of rural production. In particular, rural Haryana (India) has made great progress in raising the level of consumption, crop intensity, and adoption of high-value crops, per capita agricultural production and education levels. However, with rapid industrialization and urbanization, enhanced rural transformation has not kept pace. The agriculture of Haryana faces many important challenges, such as crop diversification, depletion of groundwater, problems with alkalinity, sustainability of soils, deficiency in micronutrients, financial education, storage, etc., as discussed in this report. This approach to analysis discusses the key issue relevant to our context.

1.14 HYPOTHESIS OF THE STUDY

1. **Ho:** There is no impact of land transformation on crop pattern and productivity.

2. **Ho:** There is no impact of land transformation on livelihood of people in Haryana.

3. **Ho:** Rural development does not affect by land transformation.

1.15 RESEARCH QUESTIONS

1. How does the agricultural land transformation occur in Haryana?

2. What are the statuses of Agricultural development in Rural Haryana?

3. What are the factors which affect the rural development in Haryana?

4. What are the current policies for the agricultural and rural development in Haryana and its impact?

1.16 RESEARCH METHOD

The primary requirement of any research is its research design. Basically, the research design is an investigating arrangement, a structure and a technique which is considered to obtain all the required responses for the study addresses in order to control variation. Moreover, the thesis is a formal laboratory application in which, the researcher may not have synchronization power over free variables. An ex-post factor analysis design was taken after the analysis was done, to

provide responses to selected research addresses. The variables that were determined for the study as of now existed and there was no degree of control on any variable.

1.16.1 TOOLS

The statistical tools in the study which were used for appropriate conclusion is frequency analysis and application of percentage was done for analysis of the collected data from formal interviews using interview schedule. Software computations namely MS- Excel spread sheet, SPSS was used as tools for the research. Along with these techniques, to analyze the primary and secondary data, the content analysis strategies were used.

1.16.2 DATA ANALYSIS

The collected data was compiled, tabulated and subjected to observations through qualitative as well as quantitative techniques. Region wise analysis will be done on comparison of different parameters like land use, cropping pattern, irrigation, fertilizer, infrastructure facilities. Analysis ofAgricultural productivity, irrigation system and Economic and social conditions of rural areas were also analyzed.

1.17 LIMITATION OF THE STUDY

The limitation of the study was to collect the data from every village of each district. The villagers were adamant for not filling the interview schedule this is the reason sample size was 286.The land record data to newest district was not available.

1.18 CHAPTERIZATION

Chapter 1: Introduction
Chapter 2: Research Methodology
Chapter 3: Transformation of Agricultural Land in the State of Haryana
Chapter 4: Agriculture Changes in Haryana in Terms of Cropping Pattern and Productivity.
Chapter 5: Agricultural and Rural Development in the State of Haryana
Chapter 6: To Explore the Major Policies, Programs of Agricultural and Rural Developmentin the Study Area with Impact of its Implementation.
Chapter 7: Findings, Conclusion and Suggestions

1.19 REVIEW OF LITERATURE

From 2001 to 2020, we conducted an empirical assessment of India's trends and degree of rural change at the state and couny levels. India's economy grew at a compound annual rate of 8.96 per cent throughout the period referred to above. A famous political goal is to enhance the very well of rural inhabitants in India because of the vast disparity between the urban elite and rural residents in socioeconomic growth (Ohlan, 2013). In light of the vital importance, several academics have examined the drivers of rural development in India (Fan, Hazell, & Thorat, 2000) (Sarkar & Kundu, 2020). In contrast, relatively few studies have focused on tracing the foundations of economic reform gains of unequal urban-rural distribution (Tiwari, Shahbaz, & Islam, 2013). Politicians have long disregarded the rural transformation, but this has changed recently. For example, the Indian government has established the National Institution for Transforming The country to replace the Planning Commission (NITI Aayog). India's rural areas are seeing rapid development, as seen by the Shyama Prasad Mukherji Rurban Mission, implemented to establish its intelligent villages (Gupta, 2015). In India's period of rapid economic growth, this research is the first to evaluate the trend and scope of rural transformation in our knowledge. To better understand India's rural-urban transition for 2001-2020, we conducted an in-depth investigation. Agricultural Land Transformation in Haryana and the Effect on Rural Development is the primary subject of this study.

1.19.1 AGRICULTURAL DEVELOPMENT IN INDIA AND ITS IMPACT

India is a tropical region and is blessed with unique climatic conditions and diverse agricultural industries. Over the years, India’s agricultural sector has continued to change, increasing the share of livestock relative to crops in the total value added of agriculture. Such systemic shifts in the agricultural sector indicate a reorientation of policies with a view to improving the agricultural value chain, with an appropriate emphasis on the production of dairy and livestock and gender-specific interventions. Over the years, India’s agriculture and allied sectors have seen enormous development. For the 2010-2017 decade, the overall decadal development rise to 3.41 per cent. (Progressive Haryana: The Agricultural Hub of India, February 2019).

The agricultural sector operates under the theory of causality. Any improvement/change in the climate or atmosphere can increase the production of agriculture and related industries and the prices of agricultural products, which has a direct impact on farmers' profits. Therefore, it is necessary to protect farmers from the unpredictable effects of nature, but it is also important to follow sustainable agricultural practices. With accelerating urbanization, enormous number of

men in search of better opportunities and livelihood are moving from rural to urban areas. Therefore, the girls still remain in the village and contributes vitally in the development of agriculture and related fields. As producers, entrepreneurs, farmers and workers, women in agriculture occupy multiple positions. It is mandatory that women's unequal access to services such as property, finance, water, seeds and markets be discussed. The role of government of India has been encouraging in promoting women in agriculture. Schemes and initiatives to strengthen the rights of woman farmers have been implemented by the nation. The following measures have been taken to integrate women into the agricultural sector: 30 per cent of funds are allocated to women beneficiaries in all ongoing growth projects, initiatives and programs. Connect women through self-help organizations for capacity development programs and allow the use of microcredits. Over the years, India's total food production has increased significantly. In 2010-11, grain output was 244.5 million tons, and in 1950-51 it was 50.8 million tons (Progressive Haryana: The Agricultural Hub of India, February 2019).

India has an enormous capacity for crop diversification. Crop diversification aims to transform crops into productive and successful enterprises. Diversified planting patterns will reduce damage to farmers, such as crop losses and price shocks. In India, promote crop diversification to improve soil quality and efficiency, thus increasing the profitability of agriculture. The Indian government is using this ability to diversify agriculture into high- value crops. Furthermore, for millions of rural households, dairy cows, mixed farming and livestock production systems are important secondary sources of income and play the most important role in creating employment and income opportunities, especially for women. Marginalized farmers and women in India. Therefore, as part of the income diversification policy, marginal farmers in India often own productive properties such as livestock and poultry. This supports wages, provides alternatives to manual labor, improves dietary requirements, and can even be used as a lever in times of financial hardship (Progressive Haryana: The Agricultural Hub of India, February 2019).

India seems to be the largest milk producer in the world. Through different central sector plans, such as the National Dairy Products and Cattle Breeding Program, the National Dairy Product Program, and the Dairy Enterprise Initiative Development Program, the Indian government is working to improve the dairy industry. It is worth noting that women, as farmers, women's cooperatives and marketers, have played a key role in the development of the dairy industry. Through the most advanced technological intervention, poultry development in India has shifted from unscientific agricultural activities to industrial production systems. India is the world's second largest fish producer and the world's second largest producer of freshwater fish. Input control in agriculture is a major contributory factor. Without destroying soil fertility and creating

environmental harm, the management of inputs in correct combinations may contribute to improved productivity in agriculture. In India, the agricultural departments concerned are now finding it necessary for farmers to implement new technology and inputs to increase productivity. The educational status of farmers is significant in this sense. The standard of schooling of farmers has an immense effect on the willingness of farmers to follow cultivation methods. With a huge number of small and marginal farmers, there are many measures being taken to educate farmers. (Progressive Haryana: The Agricultural Hub of India, February 2019).

In Indian agriculture, sufficient coverage of irrigation could yield abundant returns. The government introduced Prime Minister Krishi Sinchai Yojana in 2015 in order to expand the coverage of irrigated regions. During 2016-17, the region being taken under micro-irrigation grew to 8.4 lakh hectares. For the Per Drop More Crop programme, an additional sum is being paid out. In embracing farm mechanization, Indian farmers have been resilient, saving time and labour, reducing post-harvest losses and improving crop production and farm profits. The growth of expertise in agriculture plays a constructive function. Farmers are being supported with an outreach scheme, instruction for farmers, visibility tours, etc. Farmers are being prepared to follow the new processing technology, and post-harvest management training is being offered to women and young people. Indian tractor industries have emerged as the largest in the world with such a substantial farm mechanization andskills growth programme. With a growing populace moving from rural areas to urban areas, the introduction of farm mechanisation to support agriculture is becoming mandatory. The development of commercial crops in India has increased over the years with the versatile implementation of the new agricultural technologies. Total output of commercial crops roseto 4532,4 lakh tones in 2017-18. (Progressive Haryana: The Agricultural Hub of India, February 2019).

Another major feature of Indian agriculture is consolidating land ownership. The government has taken measures to consolidate land holdings with scattered, limited and marginal land holdings to enjoy the advantages of farm mechanisation Credit forms a significant addition to improving production of agriculture. Access to credit helps the farmer to buy cash tide inputs over times before receipt of payment from the selling of produce and to invest in improving production as well. Credit flow in absolute terms has increased dramatically in the agricultural sector over the years. The predominance of informal credit outlets for growers, however, is a problem. India urges farmers to shed the shackles of reluctance and secure their crops. Only a limited per centage of producers or farmers have access to crop insurance. There are many reasons for the low penetration rate of crop insurance. The most prominent factors are farmers' lack of understanding of crop insurance, lack of awareness of the existence of crop insurance

services, and limited crop insurance coverage in specific geographic areas. The relevant agricultural ministries and departments are taking steps to fully understand crop coverage, the scope of crop insurance and simplification of procedures, and to expand the scope to various geographic regions. With the increase in ground cover, the crop insurance system based on the Pradhan Mantri Fasal Bima Yojana Yield Index was launched in 2016 and has improved significantly. PMFBY provides complete coverage or threats to inevitable natural threats from planting to harvest. The country has introduced policies to encourage climate-smart agriculture (CSA) (Progressive Haryana: The Agricultural Hub of India, February 2019).

In order to attain high agricultural production, agricultural credit is a vital input. Major sums are disbursed by the Government of India to satisfy separate commitments to provide farmers with short term crop loans and post-harvest storage loans. This loan tends to disconnect farmers from non-institutional loan outlets. A small shift in the atmosphere or rainfall is equal to major shifts in the agricultural sector's production. The agriculture field, however, provides prospects for risk reduction that should be capitalized on. A significant part of rendering cultivation a successful enterprise is the selling of agricultural goods. In this respect, the government introduced the electronic national agricultural market (e-NAM) in April 2016. The e-Nam aims to incorporate the distributed APMCs into an electronic portal and to allow price discovery to support farmers in a competitive manner. Additional business infrastructure is being developed and major investments have been made in mobile vending carts, retail stores, main and wholesale markets. A recent emphasis is being put on developing a direct market/market for producers. Different revenue and output rise in the agricultural sector have been introduced by the Department of Agriculture, such as the Soil Health Card (SHC). The budgetary allocations for the agriculture portion have risen for each year going by. Government operates proactively via Cold Storage (CS) to facilitate Post Harvest Management, supply of the cold chain including pack houses, ripening chamber, reefer vehicle, etc. The government is working to double farmers' incomes by 2022, for which it has introduced multiple projects spanning from seed to marketing. (Progressive Haryana: The Agricultural Hub of India, February 2019).

Over the years, the agriculture industry has attracted numerous studies and trials. Agriculture Research and development is the root of agricultural creativity that is required to maintain growth in agriculture in the long term. By completing the patent application, the country has made great strides in defending modern agricultural technology. For cereals, legumes, oilseeds, commercial crops and forage crops, a total of 209 new varieties / hybrids resistant to different biological and abiotic factors have been produced. India's food protection mechanism is operated by the center and the state, which involves centralized and decentralized purchase of

food through price support operations, distribution and distribution to consumers / beneficiaries at fair prices through the TPDS (Target Public Distribution System), and for food safety and price stability. Keep buffer stocks. (Progressive Haryana: The Agricultural Hub of India, February 2019)

Over the years, the government has taken several steps to help farmers and expand India's agricultural sector. At the minimum support price (MSP) set by the government, food grains, pulses and small crops are procured. A significant initiative for people's food protection is the National Food Security Act, 2013 (NFSA). The Food Corporation of India (FCI) sells surplus stocks on the open market from time to time at fixed rates from the Central Pool via the Open Market Selling Scheme (Domestic) (OMSS-D) to raise food grain availability. Furthermore, under the TPDS/NFSA and other nutrition-based healthcare initiatives and free market activities, the Government of India offers significant and growing quantities of subsidies for food grains for delivery. (Progressive Haryana: The Agricultural Hub of India, February 2019)

India's agriculture sector is facing systemic reforms that are opening up new challenges and possibilities. In view of a significant drive for the usage of agricultural technology, the Government has launched reforms in the field of agricultural marketing and also adopted the Direct Benefit Transfer (DBT) method for the timely supply to small and marginal farmers of extension facilities, credit and other inputs. The government's key focus is to provide farmers with opportunities to diversify their income-generating opportunities by encouraging the growth of agricultural sub-sectors, such as livestock and fisheries, to reduce the numerous risks. Appropriate policy initiatives related to markets, exchange, implementation of Climate Smart Agriculture and increased emphasis on rural, marginal and female farmers are about to change agriculture and the allied market. The agriculture sector will continue to drive broad- based development, reducing inequality and provide food security. (Progressive Haryana: The Agricultural Hub of India, February 2019)

1.19.2 RURAL TRANSFORMATION IN INDIA

In the sense of national and global social and economic shifts (Long, Zou, Pykett, & Li, 2011; Wang, Khan, & Zhang, 2013), rural transformation is a constructive and optimistic phase of transition and growth of rural communities. It requires taking to rural settings characteristics of urban areas, improvements to structures and procedures that have a favorable effect on the quality of life and livelihoods of rural residents. Rural transformation is a phenomenon that is more complex than rural growth because it embodies a shift in the life perspective of citizens (Shaw, 2011). It is generally marked by shifts in civic services, women's literacy, gender ratio, structure of jobs, agricultural strength, trend of crop selection, farm revenue, productivity of labour and substantial improvements in rural housing and economic and social conditions resulting from industrialization and urbanization (Kurien, 1980) (Ravallion &Datt, 2002). Marxist views were influenced by an essential debate on the transformation of rural areas (Atchoarena & Sedel, 2003). Indeed, in order to get access to schooling, entertainment, medical treatment, government facilities, telecommunications and a variety of other facilities to sustain a full life, rural citizens are no different from other people in that they still need to exchange (Dey, 2011). Indeed, the supremacy they deserve has not been granted to rural issues, especially in the cases of South Asia and sub-Saharan Africa, where socio-economic problems are largely rural (Wang et al., 2013).

Cowan, Thomas (2018) has explored Gurgaon, India's millennium zone, has been researched and is now associated with the adoption of the global capital of real estate and economic growth driven by the Indian private sector. This paper states that Gurgaon'sspectacular urbanization was inherently focused on an unjust land acquisition process, exemptions and agrarian transition. This document discusses the new villages of Gurgaon to understand the uneven inclusion of the agrarian groups in the evolving new real estate markets, shifting away from the study centered on expelling contemporary urbanization in India. The paper seeks to trace dynamic and non-linear mechanisms of agrarian transition thatrender possible global accumulation landscapes by analyzing the various experiences of land acquisition and agrarian social change among the Gurgaon land groups.

Ramphul Ohlan (2016) stated that it has been examined that the advent of economic reforms in India has not only accelerated economic development, but has also changed the essence and function of the rural economy tremendously. The research uses a global assessment framework focused on three multidimensional indices, namely the rural growth index, the rural

transformation index, and the urban-rural cooperation index, to empirically assess the model and scale of rural transformation in India, as observed during the first decade of the 2000s. The developed rural transformation index reveals that, during the decade of phenomenal economic development, rural India experienced a radical transformation. A rise in the degree of rural development is following the transition in India. The findings are representative of a decline in urban-rural growth cooperation between 2001 and 2011 in India. In addition, regional inequalities in rural transformation are high. It is suggested, based on the results, that policies targeted at particular styles of rural change in the area may be a successful way of developing a more integrated urban-rural development paradigm in India.

Haffis et al., (2012) in their research said that the development dynamics of India's food grain economy have been figured out. The analysis uses optional data arranged for 40 years from 1949-50 to 1988-89. Compared with the research, the net result has increased, however, the productivity of food crops has increased in the past 40 years. But the expansion of productivity has not benefited the region. Due to the movement of part of the property, these crops were planted. Performance impact commitments increased from 53.42 per cent in the first ten years to 104.06 per cent in the fourth ten years. Finally, under current regional standards or low growth rates, the study concluded that my country has achieved independence in food development in recent years. The analysis offers a few implications of the technique.

Gardebroek et al. (2010) in there, think about the generation creativity and production challenge of adding Just-Pope development limits to natural and customary farmhouses in Haryana. They find that for natural farms, the inside variety of yield is completely greater, indicating that natural farmhouses face more yield variance than regular farms. Their findings indicate that in the two types of farmhouses, it is important to subtly cultivate basic variables such as administration skills and soil quality to explain yield fluctuation and generation harm. The findings also indicate that the land has the most important output versatility for the two farms. On account of ordinary farm houses and other variable inputs to the example of natural farms, function and other variable sources of knowledge have vital generation flexibility. Compost and manures are risk-expanding contributors to natural farms and risk-decreasing contributors to everyday farms. Other contingent sources of knowledge and jobs are likely to grow on all farm compounds; resources and property are likely to decrease data sources.

Sidhu and Grewal (2010) said that the labour demand for tractor-operated farms and bullock-operated farms in Punjab has been evaluated. Contrary to the assumption that the tractor displaces labour, they find that the intensity of human labour utilized on tractor-operated farms was found to be higher by 1144-man hours for each hectare than 1099-man hours on bullock-operated farms. It was observed that the rise in farm forecasts, the usage of weedicides and low salaries had a detrimental effect on human labour demand in stateagriculture.

Whitbreada, (2010) explored the simulation of agricultural systems as an open method for the creation of intervention strategies targeting smallholder farmers in southern Africa. The application of the Agricultural Productions Systems Simulator (APSIM) to credibly simulate key soil and crop processes in highly limited, low-yielding maize/legume systems has resulted in four distinct modes of use: I bringing value to field testing and demonstration; (ii) directly engaging farmers; (iii) exploring key system constraints and possibilities with researchers and extending a Code sample are given in both of these modes. While the usage of simulation is seen to be an outstanding instrument for the creation of intervention techniques and extension resources, the absence of skilled local users restricts the use of simulation. As ways of growing the usage and usefulness of simulation, stronger collaboration within the simulation culture, exchange of climate, soil and crop parameterization and validation datasets and concentrating efforts on utilizing models for the advantage of smallholder farmers are suggested. In order to address the tremendous challenges facing agricultural production in the area, considerable investments are needed in the training of farmers and the further scientific development of simulation systems.

Tingre et al. (2008) in their research said that in Akola district of Vidarbha, an attempt to learn about the cultivation of trend shifts and crop expansion was affected. The investigation found that the majority of oat crops displayed negative and low region growth rates during the time span of the examination. In the cropping pattern, soybeans have reached a crucial role. The trend of crop expansion and cropping power has basically increased. In his divisional-based investigation of Uttar Pradesh, Koshal (2012) noticed that the degree of editing systems is useful for understanding the general feasibility of the horticultural structure. Rice-wheat, Sugarcane/ratoon-wheat, Maize-wheat, and Pearlmillet-wheat and sorghum-wheat structure have been established as the main editing structures shift studies. Rice-wheat frameworks are the prevailing editing frameworks, the most outrageous progressive change observed in the Aligarh division.

Verma, et al. (2007) in their analysis, they examined that agricultural expansion in India was gradually accelerating towards high-esteem crops and domesticated animals to raise cultivation revenue. Mechanical improvements in crop development, strengthened rural infrastructure and growth of food demand were some of the components that impacted the nature and rate of agricultural expansion from staple food to high-esteem crops. Due to broad variation in agro-climatic and financial environments, the principle of agricultural enhancement contrasts across regions. On the whole, between the 1980s and 1990s, the trajectory of agricultural expansion saw a change from grain production to domesticated animal production. With increasing sales, eating routine habits have shifted from a simple oat-based eating routine to non-oat stuff on a daily basis. Taking into account the National Sample Survey results, examinations of consumption habits of Indian family units in urban and rural areas show that the income flexibility of demand for grains was poor or nil for the population as a whole, despite the fact that low-income families may, in any event, have a positive income flexibility of demand for oats.

Ramakumar and Chavan, (2007) claimed that close to the substantial increase in the aggregate credit flow into agriculture, massive movements were also observed by the existence and source of credit. For example, indirect finance represented an expanding offer of aggregate credit and commercial banks also grown in importance as a source as well as the form of institution that gives credit is concerned. As eyewitnesses point out, the concept of indirect financing (and what constituted acceptable credit lines) has grown to reflect simple increments of reach. These appear to shift through nations, then after some time, crosswise. The equally fast development of the agricultural sector is parallel to the development of the system of agricultural credit. In the past two decades, the availability of domesticated animals for crops has been expanding, with exceptional development in the poultry and dairy sectors. The yield field has seen a striking expansion, for example, to high-esteem commodities, to horticulture. The conceptual limits of farming have often become big challenges in the meantime. Increasing expenditure on knowledge outlets, fixing employment markets, increasing incomes and a wide range of environmental restrictions, such as water and soil quality depletion, have culminated in yield levels and smaller profit margins.

Jha, P. (2007) implies that for the initial two decades after emancipation, the rural population composition had stayed almost unchanged, and therefore began to migrate to non-agricultural occupations; it hit the most irregular level ever in 1989-90. This trend has experienced a reversal

contraction in rural non-farm activities since the 1990s, suggesting a decline in whatever market prospects have opened up for representatives of agricultural labour family units in this market, thus having a depressed effect on their income.

Gill (2007) inquire was undertaken in Punjab and found that 89 per cent of the state's farmers were under duty and 12.8 per cent were citizens who had virtually no choice but to commit suicide. As the farmers saw, the key factors for indebtedness were the low cost of farm development and the high cost of inputs. The farm sector's overall gratitude was measured at Rs. 21064 crores.

Joshi et al. (2007) the imaginable variables that extend horticultural extension at the farm level were analyzed in his studies. The above examinations are interpreted from various settings on a smaller scale; forces that push agrarian expansion in a particular budget set-up could be specific in another set-up. The determinants for the numerous horticultural expansion initiatives explicitly increased in the territories under non-food crops (NFCP) can be inspected in the objective mound at any rate. Like other money-related wonders, the latest inquiry also explores the determinants of expanding agriculture with reference to free market intervention. It maintains that the expansion of high-esteem crops in the area was motivated by application, which can be recognized as a nearby and worldwide order. In the interests of crops of high esteem, increasing incomes are affected. As wage creates the pattern of buyer shifts from staple sustenance stuff, such as corn, wheat, and coarse oats to high-esteem sustenance stuff such as organic goods, fruits, dairy, poultry, beef, and fish stuff. The above improvements in the architecture of the usage allow the farming network to update its portfolio of high-esteem sustenance goods.

Sreeram (2007) noticed that increased supply and regulated credit valuation assist in the development of rural productivity and the flourishing of farmers as credit is a sub-some portion of the aggregate speculations made in agriculture. A component of this sub-portion is the procurement from structured sources. With knowledge being available to a large extent from structured credit disbursement channels and suggesting that the structured credit is going down as a degree of aggregate responsibility, it turned out to be inherently more complicated to determine the causality. He also said that the diversity of trimming styles, carrying sizes, viability, local varieties made it difficult to build up such causality for all in all horticulture or country region, paying no attention to whether one had data.

Mishra and Kumar (2007) stated that aspatio-fleeting investigation captured the evolving land use in the mid-1950-51 to 1990-91 era in their work on land-use reform and food crop productivity in India. A scrutiny of the country's land use reform showed that substantial bits of land were granted to agriculture and that the region under agriculture had accomplished as much as possible with barely any advance extension fired. Waste land, uncultivable land, farms and woods have only deteriorated.

Chadha (2006) inquired found that land used for non-agricultural usage had seen a gradual growth after some period. It was a direct product of the hasty usage of land most of theperiod, often due to statistical and economic pressures, more frequently than not by weak and limited farmers. The land properties were often over-exploited by poor rural people essentially by overgrazing or erosion or destroying farming activities. The week or imbalanced usage of concoction fertilizers evacuated soil supplements and destroyed the land's yield-expanding ability. He observed that under dry cultivation conditions, the production of double cropped areas did not end up being an effective method for expanding land productivity, labour and benefit. He indicated that the property in the upper catchments could first be reclaimed.

Mohan (2006) said since 1947, the farming credit in India has been tested and indicates potential incentive. Study observed that over the years, however, the general flow of institutional credit has expanded; there are a few gaps in the scheme such as lack of credit arrangement for small and peripheral producers, shortage of medium and long-term loans andminimal store assembly, and disproportionate dependence on acquired help from major providers of agricultural credit. The study called for expansion in agriculture, which needs solid and feasible agricultural budgetary institutions, with the shifting consumption anddietary trend of the world, is expected to comply with the prerequisites of the fund for building the necessary institutional and marketing infrastructure.

Zander et al. (2005) said that the effect of organic farming assistance payments on sustainable growth in Haryana has been studied. They find that in Western European countries, organic farming payments contribute on average 4-6 per cent of gross production and 4-19 per cent in the Eastern European countries studied. In addition to salaries in Western European study countries, organic farming payments account for 10-30 per cent of family farm profits and, since EU accession, up to 75 per cent in a portion of Eastern European countries, demonstrating

the substantial susceptibility of organic farms to shifts in the organic farming strategy.

Sriram, M.S. and S. Parhi (2004) Point out that these job opportunities in the agricultural sector are seasonal. To meet growing family needs, it is important to find better business options, especially when the rural poor are not financially prepared. A study entitled Investigation into the financial situation of the rural poor: Udaipur district pilot report shows that, however, the income of rural households comes from agricultural and non-agricultural sources; non-farm income is still higher than farm income. Large numbers of people from selected areas will work in the surrounding urban habitats, as this can generate daily money to address seasonal deficiencies in agriculture.

Saxena, M. (2004) said it quickly assessed that since the 1970s, the proportion of labour force in agriculture to the overall labour force has seen a decreasing trend. RNFS was imprisoned on the subject of jobs and poverty. In addition, the report also found that technological advancement coupled with institutional changes in the agricultural sector will cause the industry to shrink further and transform underemployed workers into truly unemployed people looking for work elsewhere. Some of them may want to move to urban areas to find some jobs, but need to expand the RNFA economy to provide productive work for rural labor, because it can also help prevent migration from rural areas to urban areas.

Ramaswami, (2004) He said that to achieve production capacity and mechanize to complement existing varieties, the promotion of existing varieties has stimulated labor-saving strategies such as tractors, threshers and agricultural materials. Due to the tradition of recruitment, their rapid acquisition encourages the adoption of these technologies and even the use of small farmers. Statistical data partially supports the suggestion that tractors and other labor-saving innovations are expanding and replacing labor and livestock labor. The share of labor costs in rice production was basically stable, but declined at the end of the three decades ending in 2001.

Singh and Kareriya (2003) enquired that evolving trend of seed fixation and seed expansion have been studied in their investigations in different sections of the globe. They found that improvements in agricultural technology, natural changes and rural development in parts of Nepal have meant that, in the face of food security and unemployment problems, rapid population growth has had a huge impact on developed countries, which has led to more agricultural property burdens.

Sidhu (2001) said that the test was performed in two chosen pockets of the Punjab and Western U.P. It emerged that, against the backdrop of agricultural populations, they are increasingly approaching a monetary emergency that could contribute to social agitation in rural areas supporting 60 per cent of the population. There were sharp swings in crop prices and theharvest was marketed to private agencies by commission brokers, who were also the source of private loans for farmers but paid up to 30 to 40 per cent higher interest rates. Theinvestigation found that the 308 sample farmer family units were under obligation of varying degrees.

1.19.3 AGRICULTURAL DEVELOPMENT IN HARYANA STATE

Agriculture is Haryana's primary industry, and the bulk of the population relies directly or indirectly on agriculture and its related operations. For decades now, agriculture has become the top priority for the administration. Powerful infrastructure facilities, such as metal roads, rural electrification, canal networks, market yard growth, etc., have been developed to provide the requisite impetus for the development of agriculture in the state. These services, along with funding for agricultural science and an outstanding extension network to disseminate knowledge relevant to better farming practices, have generated tangible benefits for farmers. The total sown region in the state of Haryana has increased to 65.6 lakh hectares during 2016-17 (PE). During 2016-17 (PE), the contribution of the region under paddy and wheat crops to the overall total sown area in the state was 60 per cent. The area under wheat crops was 25.5 lakh hectares, while in 2016-17 (PE) the area under paddy crops rose to 13.86 lakh hectares. The gross food grain region has risen to 45.2 lakh hectares. In 2016-17 (PE), total food grain production in the state was 177.1 lakh tones. Rice output was 44.5 lakh tones; wheat was 123.8 lakh tones, while oilseed and sugar cane output during 2016-17 (PE) was 9.5 lakh tones, 82.3 lakh tones, respectively. The state has been turned into a state with a food surplus. With a share of roughly 15 per cent, India's central reservoir of food grains is majorly dominated by the state of Haryana. Rice, wheat, cotton, sugarcane, pearl millet, oilseeds, barley and gramme are the major agricultural crops produced in the state. With almost 80 per cent of the state's total geographical region under cultivation, Haryana is an agricultural state. The state has complex trends of agro-ecologyand cropping. In the province, there are primarily three agro-eco areas. One of the main contributors to the national food basket is Haryana. In the development of basmati rice, pearl millet, rapeseed & mustard, the state enjoys first place. More than 60 per cent of India's Basmatirice is exported from Haryana. Rice, wheat, pulses, cotton, sugar cane, pearl millet and rapeseed, and mustard are the major crops grown in the state. Cauliflower, cabbage, potato,

tomato, chillies, guava and kinnow are the major horticultural crops of the state that have strong promise. The state is well known for buffaloes from Murrah that are shipped to other countries and even abroad.

The Gross State Value Added (GSVA) development over the years has been seen in the chart below at constant (2011-12) prices of agriculture and allied activities for Haryana comparedto India. As per 2017-18 AEE, growth in the state was 2.4 per cent in the agriculture andallied business. (Progressive Haryana: The Agricultural Hub of India, February 2019) The development of agriculture and related sectors remains a key factor in the overall successof the country's economy. Agriculture and related businesses include agriculture, forestry andmining, and fisheries sub-sectors. The key component that will increase the GSVA in agriculture and related fields by approximately 92 per cent is agriculture, including food cultivation and dairy production. In view of the great importance of agriculture and related activities to economic growth and prosperity, the state government increased the expenditure on agriculture and related activities from 270.97 billion rupees in 2017-18 to 409.75 billion rupees in 2017-18, and the 2018-19 budget was 409.75 billion rupees. This means that agricultural expenditure is Rs. 1,838.5 crore, animal husbandry 1,838.5 crore. 91.34 billion rupees, gardening income 9.134 billion rupees. 834.9 crore, forestry 427.2 crore and fishery income. 83.5 million rupees. The GSVA for the agricultural sector (including crops and livestock) is estimated to be 68,776 crores, an increase of 1.8 per cent, while the GSVA for the forestry and logging and fishing subsectors was 4,146.9 crore and 1,602.8 crore, respectively,an increase of Rs. 2.1 per cent and 36.1 per cent (Progressive Haryana: The Agricultural Hub of India, February 2019).

Haryana is among India's largest producers of food grains. In 2017-18, the state exported agricultural products worth USD 1.2 billion. Haryana's state government is dedicated to developing a progressive agriculture climate. (Progressive Haryana: The Agricultural Hub of India, February 2019).

The production of food grains in the state in 2016-17 (PE) achieved a remarkable amount of 177.1 lakh tones, compared to 162.9 lakh tones in 2015-16. In driving up this agricultural development, wheat and paddy crops have played a major role. Rice output was 44.5 lakh tones, while wheat production in 2016-17 was 123.8 lakh tones. (February 2019, Egalitarian Haryana: The Agricultural Capital of India)

In contrast to India, Haryana has strong average wheat and rice yields. Haryana's average wheat yield at PE was 4841 kg/hectare in 2016-17, while India's was 3172 kg/hectare. Similarly, in the

same year, Haryana's average rice yield was 3213 kg/hectare for PE and 2543 kg/hectare for India. Therefore, certainly, the state is named the 'food basket of India'. The pro-farming and farming initiatives adopted from time to time by the state also achieved productive outcomes. (February 2019, Egalitarian Haryana: The Agricultural Capital of India).

Haryana is increasingly growing as one of the leading horticultural states in India. Almost all forms of fruits, herbs, spices, mushrooms, and flowers are grown in the province. The government has developed a horticultural vision with the goal of increasing the horticultural area from the current 7.5 per cent to 15 per cent by 2030, and doubling the state's horticultural production. The government has announced that it has established the Crop Cluster Development Program (CCDP) was established to achieve crop diversification and increase farmers' income. Under Vegetables & Remaining, about 85 per cent of the total region under crops is under fruits, spices, etc. Owing to environment & soil requirements, the horticulture department supports a cluster strategy for the better due to crop cultivation. Horticulture crops occupy an area of 4.9 lakh hectares, which is 7.5 per cent of the state's total cultivated area. Horticultural crop development in the state was 70.9 lakh M.T during 2016-17, the year. (Progressive Haryana: The Agricultural Hub of India, February 2019).

Haryana successfully controlled the surface water supply without any perennial surface water source and relied on its partially independent interstate agreement. The army is one of the main contributors to the national food basket. The Haryana State Water Management and Irrigation Department (IWRD) is primarily responsible for maintaining and protecting the state's canals and drainage network, including the provision of water for irrigation, drinking, pond filling, and other industrial and commercial purposes. Haryana has established a huge network of 1,461 canals with a total length of 14,085 kilometers. The Bhakra System has a total of 522 canals for a total duration of 5,961 km, with a total of 446 canals spanning 4,422 km in the Yamuna System. And there are a total of 493 canals extending 3,702 km in the Lift Scheme. In addition, the State has a comprehensive drainage network with nearly 800 drains covering 5,150 kms in total. There are a total of 1350 Canal Tails in Haryana. 1,343 of the tails were completely fed. The state government is dedicated to achieving Har Khet ko Pani 's vision and has raised the spending on irrigation and water supplies in the 2018-19 budget by about 20 per cent. In compliance with the standards of the Per Drop More Crop initiative in the State, the Government has taken a variety of irrigation measures to preserve and allow maximum use of each drop of water. Four schemes to improve the ability of carrier systems are in the pipeline to use the surplus water during the monsoon time in the Yamuna Dam, promising to carry around 4000 cusecs of additional water during the monsoon season (Progressive Haryana: The Agricultural

Hub of India, February 2019)

Haryana is predominantly an agricultural province, with agriculture accounting for almost 80 per cent of its land. The canopy of woods and plants stretches to 6.6 per cent of the state's overall geographical range. In order to increase this area, 14,625 hectares of land have been put under tree planting during the year 2017-18. In collaboration with the Panchayat Samities, the Forest Department has begun two new groundbreaking schemes. 58 Herbal Parks have been developed in the state to inform citizens about conventional medicine systems and engage them in the protection of endangered medicinal plant species. With the technological assistance of Patanjali Yog Peeth, the World Herbal Forest is being established in Morni Hills State, which in the near future will become an enormous repository of medicinal plants. (Progressive Haryana: The Agricultural Hub of India, February 2019)

To supplement the income of the rural population of the province, livestock is an important field. The Ministry of Livestock and Dairy Industry has implemented an aggressive genetic improvement program for cattle and keeps them disease free during peak production. According to the 2012 cattle census, the state's cattle population is 8.99 million, including 1.81 million cattle and 60.85 million buffalo. Haryana is the only state in the country where you can get A-2 pasteurized milk through the state's VITA booth. The state's per capita daily milk supply is 878 grams, while the national average is 329 grams. In July 2016, Jhajjar submitted a new risk assessment and livestock insurance plan. According to this policy, large animals such as cattle, buffalo, horses, donkeys and camels will be charged a premium of Rs 100, and small ruminants such as dogs, goats and pigs will be charged 25 ruminants for three years. The recipient will insure 5 large animals and 50 small ruminants. Cattle from included breed families will receive free insurance Top of Form Bottom of Form (Progressive Haryana: The Agricultural Hub of India, February 2019)

The food processing industry is an emerging sector of the country because it can not only create synergy between agriculture and industry, but also has the ability to promote economic growth and create billions of jobs. In order to achieve the twin goals of inclusive development and food protection, the development of the food processing sector is necessary. Food processing was listed as a thrust field in the Business Promotion Strategy 2015. The policy also focuses on having a professional labor force, stable infrastructure and a market atmosphere conducive to the growth of the entire industry. Due attention has been given to new growth factors, such as agricultural marketing reform, the establishment of large-scale and small-scale food parks, the

promotion of farmer producer organizations, the financing of agricultural food cooperatives, and the promotion of start-ups in the agricultural industry. In the program. Haryana's 2018 Food Processing and Agribusiness Strategy aims to promote the state's food processing industry. It seeks to create more employment opportunities throughout the food supply chain by establishing successful two-way relationships, thereby promoting agricultural and rural development. Food processing is the bridge between industry and agriculture. The policy targeted to double the income of farmers through the large-scale promotion of fresh Haryana products, especially fruits, vegetables, milk and fish.

Agriculture and related industries have created opportunities for the effective establishment of vibrant and potentially lucrative agricultural processing units in Haryana. As the largest producer of many agricultural products, Haryana provides a broad space for the production ofhigh value-added products. The government of Haryana aims to develop a prosperous rural economy by establishing strong links in the value chain, research, and establishing state-of- the-art infrastructure in the agriculture and agricultural sectors to achieve rapid growth in the agricultural sector Processing. (Progressive Haryana: The Agricultural Hub of India, February 2019)

The Haryana state has strong agricultural output and is thus reaping a surplus in the development of food grain and contributes nearly 15 per cent of the central food grain pool, while representing just 1.3 per cent of the national landmass. Compared to the national food grain productivity of 2,070 kg per hectare, Haryana produced 3,761 kg of food grain per hectare in 2015-16. Haryana has seen a rise in food grain production of 242 per cent compared to a 40 per cent increase nationally since 1970-713. This segment highlights the actions and sacrifices of the state to uplift the state’s agrarian sector and the prosperous prospects in the state to increase agricultural productivity. Haryana also sheds light on the potential prospects of the state for zero hunger, no starvation, healthy use and productivity, life on ground, climate action and aquatic life (sustainable development objectives) in the agricultural sense. (Progressive Haryana: The Agricultural Hub of India, February 2019)

The economic study of Haryana (2017-18) it has been explored that Haryana’s economic growth has been exemplary since its formation as a separate state, except in some times. While Haryana is a small state geographically, based on the rapid estimates of 2016-17, the contribution of the state to the national gross domestic product at constant prices (2011-2012)was calculated at 3.6 per cent. State Gross Domestic Product (GSDP) estimations are preparedby the Department of

Economic and Statistical Research, Haryana. The GSDP of the state at current prices was registered as crore 6,08,470,73 according to estimates for the year 2017- 18, registering a rise of 11.6 per cent over the previous year. The GSDP is projected to hit the 4.77.736, 26crore mark in 2017-18, with a rise of 8.0 per cent, at constant prices (2011-12). GSVA growth dropped to 8.2 per cent in 2016-17, mostly due to the low growth (5.9 per cent) witnessed in the industrial sector. GSVA development slipped further to 7.6 per cent during the year 2017-18, mostly due to the low growth in the agricultural and allied sectors (2.4 per cent).

Kaushik, Saroj, Sharma and Hooda (2015), An attempt to ponder the changes in land usage and land to Hisar town of Hisar district of Haryana state was inspired in their examination. The analysis was carried out through Geo-Spatial techniques using SOI top sheets, 1999 and 2014 LISS III symbolism and infrared that, nevertheless, there are a few changes recognized in the investigation of land use/land cover for the duration 1999-2014 but it does not indicate any tremendous ecological effects on the examination region. Due to the great trade with the connecting areas and its predominance in the field of medical care, schooling, seed processing, horticulture and vehicle repair, and due to saving parts industry, the urban shift recognition is going on in Hisar region. It has been described as an NCR counter magnet to draw in vagrants and establish Delhi as an elective development focal point. The steady demographic increase in the industrialized region of the city has made an extraordinary climb. The private and sector aggregate region that falls into the generated region has changed from 13.32 sq. Kms. towards 17.31 sq. from 7.49 sq. kms and the expanding region has shifted. From 12.90 sq. Kms.

Sihmar (2014) a district level study has found that the growth rate of agricultural production indicates improvements in the spatial trend of different crops in its analysis of growth and volatility in agricultural production in Haryana. From one point of view, in all three cycles (1980-81, 1989-90 to 1990-91 and 2000-01 to 2006-07), two crops, wheat and rice, show an exceedingly agreeable execution in their development, then again crops such as Gram, Masar, Mize and so on suggested unacceptable execution in their development. The analysis finds that the green movement and recent economic reforms have an extraordinarily beneficial influence on the development of food grains. A broad hole has been developed between prevailing crops such as wheat, rice, sugar cane and coarse oats, such as Bajara, Jowar, Maize and Pulses.

Rangaswamy (2014) in an appraisal review of the 'Integrated Rural Development Program in Haryana, it was found that the analysis was chosen among the five IRDP programmes. Insignificant shops displayed the highest results (Buffalo, sheep poultry, animal cart and unimportant shop) with 66 per cent of the beneficiaries crossing the needy line (Rs.6, 400) next came, animal and buffalo plans.

Kahlon and Kurien (2013) After the green upheaval in the mid-1960s, the impact of technological development on the absorption, efficiency and return to work of Indian agricultural labor was studied. For the main wheat producing states, namely Punjab, Haryana and Madhya Pradesh, they assessed wheat planting data from 2007-11 to 2011-13. The review found that the labor utilization rate of almost all countries showed a downward trend. In Punjab, this fall is the most amazing.

Argyropoulos et al. (2013) the enhancement of the organic agricultural aspect in Haryana was considered, both in terms of agriculture and exhibition. They also found that the success of organic farming is uneven. Moreover, though various distinct products are transported to cover the interest of the nation in organic agriculture, Greek (unlabeled) organic products are marketed as ordinary. They include the value of creating a control methodology that measures the application of organic farming frameworks, including the impact of marked organic items. The development of a supportable organic agricultural aspect, where agriculture, display, economy and learning are intertwined, is needed to enhance research to upgrade a more nuanced approach to organic farming financing.

Kumar et al. (2013) finds out the empirical relationship between contractual agreements and their implementation in organic basmati paddy farming was examined using data obtained from 40 agribusiness companies operating contract farming plans in the Haryana State areas of Sonepat, Kamal, Kaithal and Kurukshetra for the year 2011-12.3. They report that the agreements in contract outlines, viz. social capita, advance guaranteed prices, incentive clauses and clear investments in the construction of infrastructure for development and post- harvest operations in contract organic basmati conspire are likely to advance the rate of contract satisfaction by farmers. Naik et al. (2009) using a sample of 80 farmers applying correlation and multiple linear relapses, the degree and factors affecting the awareness of organic farming practises for farmers from four regions, namely Hisar, Sirsa, Karnal and Kurukshetra in Haryana State, were investigated. They found that about half of the farmers had excellent knowledge, not

all had bad knowledge, and the rest had medium levels of knowledge of organic farming activities. The degree of awareness was positively and substantially linked to schooling, the advent of mainstream media and creativity.

Sharma (2009) an experiment was carried out on 300 respondents from Yamunanagar's Bilaspur and Sadhaurasquare in Haryana. The results revealed that the landless and marginal respondents earned the most important proportion of loans, i.e., 66.44 and 52.31 per cent, via the Government Scheme under the anti-neediness schemes, which are advanced along with sponsorships at a low interest rate and have been used for productive purposes by the beneficiaries. Village cash banks, which contain 29.38 and 22.62 per cent of the landless family units and a marginal holding size respectively, are the second largest source of loans. The loan earned from cash moneylenders at a high interest rate was used by households mostly for pointless purposes. Between landless and marginal households, the ratio of loans taken from banks is 1.83 and 11.90 per cent, whereas it is 0.18 per cent and 9.72 per cent separately from cooperative social orders. The proportion of loans taken from banks and cooperative social orders is smaller because it is complex and cumbersome to take loans from banks and cooperative social orders.

Tripathi and Jha (2009) in their report, variables responsible for agricultural extension were addressed at different levels: nation (India), state (Haryana) and Kurukshetra district farmhouses in Haryana. In particular, the Simpson record and grouping of non-food crops, on a few imaginable variables, such as revenue, land dissemination, irrigation capacity, institutional credit, street thickness, urbanization and market entry, were reversed by the review. The relapse analysis drew attention to the fact that the extended street thickness, urbanization, energetic commercialization of agriculture and the commercialization of crops in the environment, according to the properties, facilities and foundations of the district, were increasingly unique to specific crops and crop-bunches. Mehta, (2010) observed that crop growth was one of the real strategic instruments that attracted limitless consideration of the material of latent growth; weak agricultural reform and low productivity in India.

Shergill (2008) in this report, the circumstances of the food economy of India from the seasonof freedom were examined and attempted to suggest the centrality of the area of Haryana-Punjab as a food supply to the Indian economy. In 2007, the Indian legislature moved the National Food Security Mission increases the production of wheat, rice, and beans in low-

productivity areas through large foreign exchange inflows. In this analysis, the creators used the trend coefficient to appear. Through the regression from 1996-1997 to 2005-06, they found that the strong desire to develop under the low productivity state to meet the growing food shortage would definitely be dissatisfied. India's food security will continue to depend on the traditional supply of surplus food in Punjab and Haryana. The study presented a case study of increasing wheat and rice yields and making them sustainable in the Haryana Punjab region.

Parthasarthy, (2008) the regular cash salaries in 1984-85 were calculated to be between Rs. 6 and Rs. 11 generally (with the exception of those in Punjab, Haryana and Kerala where they were higher), as compared to this, the minimum wage needed to sustain a basic minimum living level was Rs. 22 regulars. Cash pay prices continued to rise with the start of the green transformation. Be it as it might, the actual salary increases did not raise much as expenditures have rose dramatically. Khatkaretal (2007) in the Bank and Integrated Rural Development Policy Affect Inquiry on Rural Poor Wages, Industry and Usage Spending in Mahendragarh of Haryana, income and family costs increased dramatically in all categories. In the case of small farmers taken after by marginal farmers and landless labourers, the production improved further. In the case of marginal farmers taken after by landless labourers, the job generation was found to be more.

Khatkar and Singh (2006) in order to discover the relation between consumption and outputin Haryana and Rajasthan's dry zone, two chosen districts from each state were considered. Analysis in the light of data obtained from two farm groups, i.e., flooded and non-flooded. Cereal intake in both farms is not quite the proposed amount, i.e., 520 gm/per capita/day, but it is more than the national accessibility of 428 gm/per capita/day, it is found. In non-irrigated fields, the intake of cereals is higher than that of irrigated farms, which contributes to thrivingin spite of the unfavorable connection between income and consumption of cereals. It shows little connection with irrigation. It was found that the consumption of coarse cereals and pulses on non-irrigated farms was higher, inferable from the higher output of these goods on such farms and that of fine cereals. As these crops are greatly established in the dry regions, the lower intake of coarse cereals and pulses in these parched areas suggests nutritional awkwardness in the eating routine. Holding the productivity of essential crops in the study areas lower, there is a need to improve productivity by sufficient technological advancement and expansion exercises to satisfy food protection requirements.

Haque (2005) generally, as a consequence of the farmhouse section, the advancement of the non-cultivated field takes place naturally. In addition, the structure is substantially established. In any event, there was no such change in the non-cultivated portion. The intention behind this, as deciphered by Ramanujam, is to focus work on the editing style in Punjab and Haryana. Work is pulled back from the assembly division along these lines, resulting in a limited growth of the non-cultivate region. He also stressed the need for the development of composite capacities in the function of the government.

Singh and Kaur (2004) in addition to the agriculture field, imperative markers of economic growth have been studied in Haryana. The analysis analyses the growth of agriculture in Haryana based on various production and knowledge indicators, such as crop trends, irrigation, the usage of modern technology, and so on. Agricultural development in the state displays impressive trends, but it relies significantly on the production of rice and wheat. In addition to the apparent change in the consuming trend away from cereals to non-cereals, the vast selection of rice and wheat stocks brings forth a defense that the arrangement focus should be reoriented towards the development of non-grain crops, i.e., oil seeds, peas, organic goods, vegetables and dairy. Rural infrastructure, i.e., transport, rural streets, strengthened and solid power system, watershed administration, cool stockpiling and institutional support through the development of modern business facilities, must be set up to advance progress. Study and augmentation in agriculture should be progressed. Focus on the lowest price help that has supported only rice and wheat at the detriment of various crops and agricultural goods needs a re-evaluation of the policy with the aim of energy recovery for crop enhancement.

Bhalla, and Singh (2001) it claimed that a big development that changed the rural scenario in India was the implementation of new seed fertilizer technology during the mid-1960s. The modern High Yield-Variety (HYV) technology was almost restricted to Punjab, Haryana and a few places in Western Uttar Pradesh (UP) in North-Western India during the early phase of the green uprising. Some important improvements in the essence and pattern of agricultural production in India were recognized in its implementation. Both the region under cultivation and the yield of these crops have improved dramatically, contributing to an improvement of performance growth rates in the areas that have embraced the modern technologies.

1.19.4 IMPACT OF AGRICULTURAL TRANSFORMATION ON PHYSICAL ENVIRONMENT

Planning authorities around the globe are high on the agenda when it comes to the development of food processes and their effect on the natural ecosystem. Since 1965-66, the transition of agriculture from primitive subsistence to modern intensive commercial grain farming has led to significant changes in important components of the physical climate, such as water, land, air, etc., resulting in agricultural pollution in the study region. In agricultural practice, contamination may come from a number of causes, such as the usage of chemicals, herbicides, fertilizers, and water resources; landscape alteration; deforestation and burning of farm waste, etc. (Environmental Statistics of Punjab, 2012)

The foundation of agriculture and two fundamental components of the climate, i.e., water and land, are endangered in the study area because of their unequal use. Over-intensification of cultivation has contributed to a decline of soil productivity and a reduction in water supply quantity and consistency. The accelerated usage of agricultural chemicals to raise yields has contributed to soil resource quality imbalances. A World Bank study (2007) showed that excessive fertilizer usage would contribute to human and animal poisoning and water pollution, which, in turn, can have indirect implications for broader habitats. In rice-wheat systems in South Asia, some detrimental results have been observed (World Bank, 2007). In the study region, wheat-rice monoculture has also adversely affected soil productivity, since both of these crops have strong nutritional requirements. The introduction to this semi-arid area of hygrophyte crops such as rice and unreasonable groundwater extraction to support this crop have to disrupted the under-ground water balance. The depletion of the region's land and water supplies and other relevant environmental issues is a troubling indication of the region's potential key economic activity, i.e., agriculture. A report by IFPRI (2006) set the farm sector in Punjab on a red warning. The Punjab-2005 State of Environment Study summarized the environmental issues in the following words: Over the years, intensification of cultivation has contributed to water scarcity, decreased soil productivity and micro-nutrient deficiency, non-judicious usage of farm chemicals and pesticide residue issues, decreased genetic diversity, soil erosion, water and atmospheric contamination and overall loss of soil contamination.

There is no question that the latest seed-fertilizer technology has introduced economic growth and lush green fields to the Punjab-Haryana plain, but the environmental costs of this technology are so immense that the very survival of the region's agriculture is challenged. Rapid

degradation of sub-soil water supplies, pollution of sub-soil water through percolation of chemicals due to over-irrigation, water-logging, soil contamination through unwanted saltsdue to capillary activity in comparatively dry areas, loss of soil productivity due to leeching away of micro and macro nutrients from soil with water, exhaust from soil with water are the significant environmental problems faced by the study zone. The effect of agricultural activities on the climate of the research area must also be investigated.

Water is an important resource for agriculture and supports the phase of plant nutrition. In an agricultural area such as the Punjab-Haryana plain, where more than 82 per cent of the land is agricultural, it is not possible to ignore the value of water as a deciding factor for agricultural performance. In the sub-tropical climate, the semi-arid rainfall system further raises the roleof water in the area. The agriculture of the study area is mainly sustained by irrigation due to the insufficient, unpredictable and strong coefficient of variability of the annual precipitation. Since the advent of seed-fertilizer technologies in the mid-1960s, the market for water has raised manifold. Normal and ample water sources are needed for the use of high yielding varieties of seeds and chemical fertilizers. The rise in crop intensity from 139.56 to 185.68and the overall area under cultivation from 10635 thousand hectares to 14233 thousand hectares from 1970-71 to 2010-11 has raised the demand for water. The change in cropping trends from water-economizing crops to hygrophyte crops, such as rice and vegetables, such as jawar, bajra, pulses and oil seeds, has significantly increased water demand. By building tube wells in the area, this rise in demand for water has been addressed. The overall numberof tube wells in the region was 202927 in 1970-71, and 2.66 tube wells is the density of tube wells per hundred hectares of net area sown. In 2010-11, however, the total number of tube wells in the region increased to 1635578 and the average density of tube wells was 20.67 per hundred hectares of net area sown, which was the maximum among the Indian states. The high number of tube wells has culminated in the exploitation of energy from ground water. In26 out of 41 districts in the sample area, the total annual groundwater intake is more than the average annual recharge.

There is a high stage of groundwater production in the districts of Amritsar, Tarn Taran, Kapurthala, Jalandhar, S.B.S. Nagar, Ludhiana, Moga, Fatehgarh Sahib, Patiala, Sangrur, Barnala, Mansa, Fatehabad, Kurukshetra, Kaithal, Karnal, Panipat and Gurgaon. In the central part of the study area, this forms a continuous belt which runs from north-west to south-east. The key crops are paddy and wheat and the rate of cultivation is large in this belt. Because of the semi-arid subtropical climate, the cultivation of hygrophyte crops is largely based on existing irrigation methods. In several of these districts, the level of irrigation is 100 per cent and tube

wells are the primary source of irrigation. The area is defined by a veryhigh density of wells for tubing. Excessive exploitation of ground water is taking place owingto excessive dependency on tube wells. The long-term pattern in the amount of water over tenyears shows that the volume of water in all these districts is decreasing. If this development persists, it will prove to be a significant challenge to the potential survival of agriculture. In order to resolve this problem, cropping patterns need to be altered in favor of low crop consumption of water.

The regions where the stage of groundwater production varies from 75 to 125 per cent are flanked by the elevated phase of groundwater development in the east and west. It involves the north-eastern districts of Gurdaspur, Hoshiarpur, Rupnagar, S.A.S. Nagar, Ambala and Yamunanagar, and the south-western districts of Firozpur, Faridkot, Bhatinda and Sirsa. In the sample area, the north-eastern belt has a sub-humid climate and the largest volume of rainfall. In addition, this region has unfriendly soil, incoherent & infertile soil that does not permit paddy cultivation here. Therefore, the stage of groundwater production is mild due to the low demand for irrigation water and the availability of more water for sub-soil aquifer replenishment. The density of tube wells is poor in the south-western belt because the sandy soils support cotton cultivation and deter paddy cultivation. Thus, the stage of ground water production is moderate, considering low rainfall. In addition to these two belts, in the southern part of the study area, which includes the districts of Sonipat, Jhajjar, Bhiwani, Mahendragarh, Rewari and Mewat, a moderate stage of ground water growth is also noticed. Because of natural constraints raised by rugged surfaces, salty and alkaline soils, brackish under-ground water and dry environment, agriculture is not well established. In this region, the density of tube wells is also poor. Thus, relative to the central zone, the exploitation of groundwater is less than.

The Panchkula, Shri Muktsar Sahib, Hisar, Jind, Rohtak, Faridabad and Palwal districts have the Low Stage of Ground Water Production. These regions are best suited to maintainunderground water supplies since they have low tube well intensity and the mix of crops does not involve a large volume of water use. In addition, several of these districts have well established canal networks. Canals not only provide surface water for irrigation, they add to sub-soil aquifers, particularly unlined canals, by percolating water. To say, the bulk of the research region is ruthlessly manipulating underground water supplies. In the future, preserving the biological equilibrium of the region could be quite troublesome. The key cause for this troubling circumstance is the improper combination of crops with the climatic conditions in the field. The region has a semi-arid to arid climate, but the main crop in most places is the Paddy, which

needs daily water supply. The high number of tube wells has contributed to this. There is a very high positive association between tube well density and the production stage of ground water. Much of the area in the northern part of the sample region is at a high level of underground water production, while the condition in the southern part is not that worse. In the central region, where agricultural transition is most carried out, the worst scenario exists. The places where water extraction is less in the northeast and southwest and south are those where paddy is not the primary crop.

The study of long-term water level fluctuations showed that the water table in the Punjab portion of the plain between 1993 and 2003 declined at an annual pace of 55cms/year. A decline of up to 75 cm per year has been reported in the districts of Amritsar, Kapurthala, Jalandhar, S.B.S. Nagar, Ludhiana, Rupnagar, S.A.S Nagar, Patiala, Fatehgarh Sahib, Moga, Sangrur, Barnala, Kurukshetra, Kaithal, Panipat, Sonipat, Mewat, Rewari, Bhiwani, Jind and Sirsa. Research by Hira et al. (2006) found that the districts of Moga, Sangrur, Patiala, Jalandhar, Ludhiana and Kapurthala were the hardest affected, as the depletion of the water table above 10 meters rose from 3 per cent in 1973 to 95 per cent in 2005. The report also forecasts that the water level would drop to 50 meters in 66 per cent of the central districts by 2030.

The report (January 2013) prepared by the Planning Committee of the Punjab Provincial Senior Expert Group on Standing Water Issues for the Government of India stated that when the local water level rises to the level of the root soil porosity, the area is considered to be flooded. The crop area becomes saturated, resulting in restricted natural air circulation, reduced oxygen content, and reduced oxygen content. The dangerous depth of the groundwater table depends on the type of crop, soil type and water quality. The consumption of plant nutrients and the consumption of beneficial microorganisms and the risk of developing other dangerous microorganisms are caused by waterlogging. Chemical depletion is often induced by the deposition of salts on the soil surface, contributing to biological imbalance. Due to decreased or zero output, farming operations in water-logged areas are becoming challenging to carry out.

The criteria for identifying a water-logged region were prescribed by the Working Group of the Ministry of Water Supplies (1991). If the water table remains within 2 meters of the surface of the soil, a region is considered to be water-logged. If the water table is below 2 and 3 meters of surface ground, a region is considered to be possibly water-logged 112.40 sq.km in the Punjab

part of the sample area in 2005-06, the region was under water-logging conditions, which rose to 118.19 for 2008-09.72.08 sq.km in the Haryana section of the plain in 2005-06, the field was water-logged and limited to 48.85 sq. kms. (Source: Government of India, Space Agency, ISRO, National Remote Sensing Centre) in 2008-09. In sections of the study region, a multitude of factors are responsible for water logging. These involve intrusionfrom the unlined earthen canal system, defective canal alignment, region depression position, insufficient drainage of the soil and sub-surface due to extremely gentle slope, ground levelling contributing to a massive destruction of the natural topography and drainage, low percolation due to impermeable clay strata, low water management methods, drastic improvements in cropping patterns and drainage. In the south-western areas of Punjab, the application of surplus irrigation and recharge from the dense canal network induces a steady increase in groundwater. Because of capillary activity, the salts rise and induce soil salinization that makes soil unsuitable for cultivation. Moreover, the condition is exacerbated by signs of a reverse influx of saline groundwater from the south-western area to the drained sweet water zone of the central districts of Moga and Sangrur. The groundwater normally flows from north-east to south-west in the Punjab component of the plain. In the central region, water continued to move in the opposite direction due to the over-extraction of water by tube-wells. Research by PAU, Ludhiana has shown that owing to the reverse flow of salt water, sweet water has become brackish. In the Nihal Singh Wala block, the proportion of this saline water increased to 30 per cent in 2004, compared to 11 per cent in 1997.

For plant growth, conservation of soil fertility, and for the protection of the environment, the quality of water used for irrigation is extremely significant. Awareness of the consistency of irrigation water is important for sustaining long-term efficiency. Utah State University Extension services emphasized that the amount of water a plant will soak up, resulting in high
plant stress and reduced yields, is constrained by high salt concentrations. In addition to influencing crop production, water quality can influence the physical conditions and chemical composition of the land, the efficiency of the irrigation system and durability. There are also detrimental impacts on grain production owing to elevated metal concentrations. Taking into account salinity (EC), sodium adsorption ratio (SAR) and residual sodium carbonate (RSC), pH, and alkalinity, the suitability of ground water for irrigation is usually calculated.

Salinity, as calculated by electrical conductivity (EC), is the most significant water quality that affects crop productivity, according to Bauder, Waskom & Davis (2004). The primary influence

on crop production of high EC water is the failure of the plant to cope with ions in the water solution of the soil. Even if the soil looks moist, the higher the EC, the less water is accessible to plants. Because only pure water may transpire from plants, available plant waterreduces as the EC rises. The quantity of water that a crop generates is directly linked toyields. So, the high EC irrigation water lowers yields. The electrical conductivity of irrigation water at 25 ° C is estimated in Deci Siemens per meter and the EC of water for crops does not surpass 3dS/m. While millimhos per centimeter (mm/cm) and micromhos per centimeter (μmho/cm) are also commonly used, the recommended unit is Deci Siemens per meter(dS/m).

In the districts of Tarn Taran, Gurdaspur, Amritsar, Jalandhar, Kapurthala, S.B.S. Nagar, Hoshiarpur, Rupnagar, S.A.S. Nagar, Ludhiana, Fatehgarh Sahib, Ambala, Panchkula, Yamunanagar, Kurukshetra and Karnal, the EC value is within acceptable limits, i.e., less than 3dS/m or 3000micromhos/cm. So, the ground-water is ideal for agriculture on soils that are well drained. When used for traditional irrigation, these waters would not create any salinity or sodium danger. In sections of Firozpur, Faridkot, Shri Muktsar Sahib, Bathinda, Moga, Sangrur, Barnala, Patiala, Kaithal, Sonipat, Rohtak, Jhajjar, Gurgaon, Mewat, Faridabad, Palwal, Mahendragarh, Rewari, Jind, Hisar, Fatehabad, Sirsa and Bhiwani districts, the EC value is greater than 3dS/m. When used for irrigation, this water can cause moderate to very high salinity hazards. This water can be used for soils with good drainage and semi-salt-tolerant and salt-tolerant crops such as wheat and rice.

In most sections of the Moga, Panipat and Faridabad districts, fluoride concentrations are greater than the allowable maximum. The fluoride concentration in the Faridabad district is higher than the permitted level of 1.5 mg/1 and the SAR ranges from 2.19 to 15.79 and the RSC range from -14.52 to 13.97 milliequivalents. Since they may cause salinity and sodium risks, these waters are not ideal for normal irrigation. It will be safer to use these waters on well-drained soils for semi-salt resistant crops or salt resistant crops along with suitable gypsum. In the south-eastern and north-western areas of the Moga district, iron concentrations are found in shallow water to be higher than allowable levels and copper and iron concentrations are found in the Panipat district.

The acidity and specific properties of irrigation water are represented as pH (< 7.0 acidic; > 7.0 specific). For irrigation water, the standard pH range is from 6.5 to 8.4 (Bauder, Waskom & Davis, 2004). Accelerated irrigation system corrosion can result from abnormally low pH values.

When calcite or scale build-up induces decreased flow speeds, high water pH value may be troublesome for drip and micro spray irrigation systems. By collecting salts by evaporation on the land in hot and dry regions, highly alkaline water may have a negative effect on soil fertility. In the sample area, the pH value of water ranges from 6.89 in parts of Jalandhar district to 9.21 in parts of Sirsa district. In the districts of Gurdaspur, Amritsar, TarnTaran, Kapurthala, Jalandhar, Hoshiarpur, Rupnagar, Ludhiana, Moga, Patiala, Fatehgarh Sahib, Ambala, Kurukshetra, Rohtak, Jhajjar, Gurgaon, Mewat and Rewari, the usual pH range of the water is 6.5 to 8.4. In the districts of S.B.S. nagar, Firozpur, Shri Muktsar Sahib, Faridkot, Bhatinda, Sangrur, Barnala, Panchkula, Yamunanagar, Kaithal, Faridabad, Palwal, Jind, Fatehabad and Sirsa, the pH value is beyond the usual range.

A portion of the Indo-Gangetic plain created by alluvial deposits is the Punjab-Haryana plain. The land is fertile and is ideal for the production of most crops. This place has a long tradition of human occupation that goes back to more than 5000 years owing to rich lands. The agricultural resources, particularly soils, have been used extensively for livelihood due to the early settlement of the region. The agriculture of the research area has witnessed widespread changes following the advent of seed-fertilizer technologies in 1965-66. It has converted rudimentary farming from agriculture to extensive industrial farming. Heavy cultivation activities have placed immense strain on the region's soils and have contributed to a gradual decrease in fertility. Since 1970-71, the adoption of the Wheat-Rice crop series has increasingly exhausted the soil's nutrient content since each of these crops has strong nutritional requirements. The soil status is defined below with respect to macro nutrients, i.e., NPK and micro nutrients.

Due to scanty vegetation cover, the soils of the study area are typically poor in organic matter. Luxurious plant development has been hindered in the area by the semi-arid to arid rainfall system. In the field, whatever little natural vegetation was left was cleared for crop cultivation. In addition, this has added to the poor organic soil quality. Instead of being recycled into soil through mulching, wheat and rice straw, which is a rich source of nitrogen, is burning in the fields. Restricted use of organic manure is another explanation for the poor organic content in the soil. The organic carbon deficit in the southern and south-western areasof the sample area is more acute. Study of 180,000 soil samples at PAU, Ludhiana from 1981to 1992 showed that 78 per cent of Punjab soils were deficient in soil organic carbon (0.75 per cent SOC). Bathinda, Sangrur, Faridkot, Hoshiarpur and Amritsar districts had more than 80 per cent low- category

samples (Brar et al., 1994). A comprehensive map prepared by the Department of Soil Sciences, CCS HAU, Hisar (2011) showing the organic carbon status of the soils of Haryana shows that low (< 0.4 per cent SOC) organic carbon was present in major sections of the districts of Bhiwani, Rewari, Gurgaon, Mewat, Faridabad, Palwal, Mahendragarh, Hisar, Sirsa, Fatehabad, Ambala, Yamunanagar and Jhajjar. Sections of the districts of Kurukshetra, Kaithal, Karnal, Panipat, Sonipat, Jind, Fatehabad, Rohtak, Yamunanagar, Ambala and Sirsa have been found to have low and medium organic carbon (0.4-0.75 per cent). There was onlya tiny patch of soil with large (> 0.75 per cent) organic carbon in the Panchkula district, whereas most areas of the district had medium organic content soils. Soils of the Haryana portion of the plain had low organic carbon on an average of 68.40 per cent, 31.47 per cent hadmedium and just 0.13 per cent had strong organic carbon content.

In general, the soils of the sample area have a low to medium phosphorus content. One of the three macro nutrients necessary for the growth of plants is phosphorus. With less than 10 kg/ha P usable, the coarse textured soils of the southern and south-western sections of the study area, especially Bathinda, Firozpur, Faridkot, Mahendragarh, Rewari, Jhajjar, Mewat, Hisar and Fatehabad, are especially deficient in phosphorus. The Haryana plain's 20.81 per cent field has soils of low phosphorus content. The phosphorus content of 43.95 per cent ofthe region in the Haryana portion of the plain is moderate (10-20kg/ha), primarily in the districts of Sirsa, Fatehabad, Hisar, Bhiwani, Rohtak, Sonipat and Palwal. In the districts of Panchkula, Ambala, Yamunanagar, Kurukshetra, Karnal, Panipat, Gurgaon, Faridabad and Bhiwani, a large (> 20 kg/ha) P content is found in over 35.24 per cent of the region.Temporary study by PAU of the phosphorus content in the soils of Punjab, Ludhiana has indicated a substantial decrease in the P content in the soils. The data reveals that in the low P category, the number of samples rose from 45 per cent in 1981-86 to 70.7 per cent in 1996-2001. The amount of low- and high-category samples fell from 29.4 per cent to 19.3 per cent and 25.6 per cent to 10 per cent, respectively. The decrease is due to the crop series of rice-wheat that rapidly exhausts the soil's phosphorus content.

The potassium content of the region's soils is typically low (138-338 kg K2O/ha) to large (> 338 kg K2O/ha). As a consequence, the use of K fertilizers is comparatively poor and comprises 2 per cent of the overall use of chemical fertilizers. There is low to medium K material in the Kandi zone in terms of spatial variations. Temporal study from 1975 to 2001 by PAU, Ludhiana, showed that the shortage of potassium in the region's soils has not deterioratedover time. As

stated by Benbi et al., 2006, the occurrence of micaceous minerals in the soils and the addition of significant quantities of potassium by irrigation water can be due to the preservation of K status in the soils of the area. The region's irrigation waters produce K varying from 0.6 to 124.5 mg/II.

While needed in small amounts, micronutrients, including zinc (Zn), copper (Cu), iron (Fe), manganese (Mn), boron(B), molybdenum (Mb), chloride (CI), are equally essential for plant development. Current exploitative cultivation, based on large crop yields, has drained the soils of their small stocks of micronutrients. In various soils and seeds, the degree and type of this deficiency differs. On average, 350g/ha of Zn, 50g/ha of Cu, 3000g/ha of Fe and 550g/haof Mn are extracted from the soil by a strong crop of paddy (with a yield of 6ton/ha) and wheat (4ton/ha) (Source: Nayyar et al., 2001). A 1990 survey conducted by Nayyar et al. found that 49 per cent of soils in the Punjab portion of the plain were deficient in usable Zn and17 per cent in Fe. The survey stated that the deficiency of Mn and Cu was insignificant. In the Haryana portion of the plain, 74 per cent of the usable Zn soils are deficient.

1.19.5 PROGRESS ON SUSTAINABLE CONSUMPTION AND PRODUCTION

Water Conservation: The state government is working to replenish groundwater sources. The state introduced a mandatory rainwater irrigation program to encourage crop diversification and switch to crops that consume less water. Therefore, farmers are getting away from the daily rice/wheat growth cycle and switch to micro-irrigation technology. The groundwater management plan for rainwater discharge for agriculture, plantation, fishery, pasture production, etc. has been launched.

Soil and Air Management: While striving to minimize the use of pesticides and fertilizers, the Haryana government is committed to improving soil depletion. The government of Haryana has issued soil health cards to farmers to help control the amount and form of fertilizer that can be used on their land. Such initiatives also help increase the consistency of the air inside the state. The Haryana government currently has a robust regulatory structure to enhance air quality, including the establishment within the state of four environmental air quality monitoring systems to quantify levels of pollution.

Waste Management: A range of legislation, legislation and alerts have been enforced by the state government to establish a regulatory system that regulates the production of waste and

emissions. These include 1140 lakh Metric Tons of crop residue rendered available for use as a source of carbon credit in the form of wheat stubble and paddy straw.

Sustainable use and processing patterns: The management of the processing, transport and storage of food grains, pulses, cotton and vegetables is in the state's initial stages. Within agriculture, a cluster-based approach to fruit production is currently encouraged by the Department of Horticulture, considering variations in climatic and soil environments. This culminated in an improvement in the field used and the development of berries. The Haryana State Agricultural Marketing Board has formed the marketing of this commodity to facilitate 108 Primary Yards, 173 Sub Yards and 196 Centers of Buying. In addition to this, 4,870 rural connecting roads with a length of 12,583 km were also built by the Board until January 2018.

Food grains: The Haryana state government is building many new covered storage facilitiesto minimize storage losses in order to better meet the storage needs of many locations in the state.
To modernize Haryana's power grid, many measures have been taken to minimize agriculture's dependence on non-renewable resources, such as discount programs, incentives, cogeneration, and legislation related to the mandatory construction of environmentally friendly technologies. To more efficiently dispose of agricultural waste, a cluster-basedcomposting plant method has been introduced and plant development has started in Bhuna, Hisar, Bhiwandi, Puhana and Farukhnagar. The province is implementing a crop diversification policy to minimize agricultural waste. The design of the agricultural waste treatment framework will allow the country to reduce agriculture's dependence on non-renewable resources and guide the effective use of agricultural waste.

1.20 RESEARCH GAP

The government's numerous efforts to improve agricultural production to fulfil the nation's food needs have contributed to large-scale ecological losses in the Punjab-Haryana plain, such as micro-nutrient deficit, soil degradation, water-logging, soil contamination, soil alkalinity and salinity. Major surface nutrients have been derived through the extensive usageof farm land for growing crops annually. Significant nutrient imbalances in all areas of the sample region have been induced by farmers' attempts to improve soil productivity by the application of chemical fertilizers. Chemical fertilizer intake per hectare in the study area was 420 kilograms, which was the maximum in the world in 2010-11. The more important concern than this is when fertilizers

without prior soil tests are applied to the soil. Year after year, the fields are supplied with the same fertilizer without bothering regarding soil requirements. The unfair usage of chemicals has contributed to a significant shortage of organic matter in the soil, which is important for soil quality.

1.21 SUMMARY

The development of the agricultural sector is critical to the overall growth of the country, and this is also true in the modern economy. Therefore, the government of Haryana will work to increase the growth rate of the primary sector through initiatives focused on agriculture and animal husbandry activities. Together with the responsive agricultural population, the implementation of such ambitious state-of-the-art policies has led to the state's very steady development in agriculture. In the state's GSVA, the share of the agriculture sector (primary sector) is about 19.5 per cent. In 2016-17, the sector has recorded phenomenal growth of 7 per cent from 3.2 per cent in 2015-16. Haryana is emerging as one of the leading horticulture nations. The State is also working to improve the development of other related agricultural practices such as fishing, animal husbandry, forestry and irrigation. Moving forward, the state is encouraging diversification in the agricultural sector, developing the R&D framework and updating facilities in accordance with international standards to take advantage of emerging prospects in the state's agricultural sector. The previous research shows the disturbing state ofthe study region's physical climate". Agriculture intensification has threatened the efficiency of different environmental components. Since 1965-66, the usage of high-yielding variety crops, agro-chemicals and the change in the cropping trend towards paddy has led to unreasonable underground water mining. The area has the country's largest density of tube wells that pump out vast amounts of deep water. In places where the quality of ground water is high and canal water is limited, ground water falls by 30 cm each year. Seventy-five per cent of the total blocks display groundwater extraction and about one-fourth of the blocks are protected. Water logging, on the other side, has left acres of fertile land unfit for agriculture. Land water quality is declining owing to the percolation of waste water and the usage of agricultural pesticides is one of the key causes for water contamination. Since 1970- 71, the advent of the Wheat-Rice crop series has quickly reduced soil nutrient material, since both of these crops have strong nutritional requirements. The accelerated usage of agricultural chemicals to maximize productivity has contributed to micro-nutrient imbalances, thereby impacting the consistency of soil supplies. Throughout the research era, the study area has undergone substantial agricultural change, although the environmental costs of this change are worrying.

CHAPTER 2

RESEARCH METHODOLOGY

2.1 INTRODUCTION

Research approach is a systematic and logical method for unraveling the research problem. It might be understood with reference to how the research was finished logically. As research is a systematic investigation for acquiring significant data, the accomplishment of a research is incredibly reliant on its procedure. It is said that 'The outlining and sticking to the suitable approach all through, enhances the nature of a research'. This part manages the methodological proceedings of the present examination. The points of interest of research design and the different advances that are received in concentrate the research problem alongside the rationale behind them are portrayed (Kothari, 1990).

This section depicts the methodical aspects of the present research study. It manages the research configuration received for the study, population and test of the study, the inspecting system utilized, the tests regulated, the strategy pursued for data collection, and the measurable gadgets utilized for the examination of the collected data. At the start, a short hypothetical investigation into the attributes and difficulties of psychological research is made. It likewise harps on the methodological issues associated with psychological research.

There may not be a literature review that attempts to assess the level of agricultural development in Haryana, and there may be no spatial changes provides a challenging and potentially rewarding area of such research. Haryana is one of the most prosperous and progressive states in India (IBEF, 2020). In a very short period of time, Haryana has taken a top place in the agricultural sector. Haryana has grown from a huge food-deficit area to today and has become one of the most unique developed agricultural regions in the country. Despite the various developments in the state, there are indeed spatial differences in the level of agricultural development, which requires in-depth research. The net sown area in Haryana was recorded at approximately 78 per cent in 1966-67 and it was increased to over 81 per cent in 1990-91 (Rani, 2019). During the 30-year period from 1950-51 to 1980-81, the degree of intensification increased, and the area where more than one crop was planted each year expanded significantly.

In the past 30 years, due to rapid population growth, urbanization and industrialization, the problems of population, environment and land resources have always attracted the attention of the government. Due to the continuous upward process of all these aspects, the impact on natural resources, especially land resources, is also great. In addition, the earth's resources also face

many problems such as soil erosion, salinization, and seepage. Therefore, there is an urgent need to manage all natural resources to meet the growing population and environmental sustainability needs of the country. We have adopted study entitled **The Transformation of Agricultural Land in Haryana and Its Impact on Rural Development** under which we will discuss the all aspects on the basis of Statistical Abstract of Haryana, Economic and Statistical Organization, and data would be taken in decadal from average periods 1969-70-71, 1989-90-91, 2009-10-11 and 2011-2018 as well as interview schedule after pilot study all aspect check their reliability and validity test for utilizing the further study and analysis as required in this study.

2.2 PILOT STUDY

BT "Basavanthappa defined the research design as the plan, the structure and the research strategy to answer the research question is the general plan or the plan that the researcher chooses to carry out his study. The selection of the research project is the most important step, as it provides the framework for the study. The design of the research helps the researcher in the selection of subjects, in the manipulation of independent variables, in the control, in the collection of data and in the type of statistical analysis used to interpret the data. According to statistics, pastures and permanent pastures decreased by 30,000 hectares between 1970 and 1990. The proportion of the reported area decreased from 1.2 per cent in 1970 to only 0.5 per cent in 1990. Fallow land increased by about 20,000 hectares from 1970 to 199, while the net area planted decreased by about 25,000 hectares (a small part of the total) in the 1980s, which may indicate that arable land with insufficient soil nutrients or higher salinity has been reduced, retired. In addition, in the year 2017-2018, the total production the crops were 17,630 Tons of Production of Total food grains (000 tones). Unacceptable salinity levels may be related to the combined effects of inappropriate agricultural practices, lack of adequate drainage systems, and groundwater extraction. A change in land use over a period of time can be classified as the change of land from one use to another (for example, the transfer of land from agricultural use to non-agricultural use; the change of land use within a given land use category (for example, agricultural". The transfer of land from one crop to another); and changes in land use intensity (for example, a farmer grows more than one crop each year, resulting in higher planting intensity.) These three types of land use changes can occur simultaneously; They are not necessarily continuous in nature. 10 per cent of total sample suggested about the land productivity of Haryana.

Table 2.1: Greater agricultural and labour productivity output of rural after transformation

Opinion	Respondents
Agree	11
Strongly Agree	9
Disagree	5
Strongly disagree	4

Table 2.2: Greater agricultural productivity of rural labour after transformation

Opinion	Respondents
Agree	9
Strongly Agree	8
Disagree	7
Strongly disagree	5

Table 2.3: Greater Crop selection pattern is better after rural after transformation

Opinion	Respondents
Agree	10
Strongly Agree	7
Disagree	6
Strongly disagree	6

Table 2.4: Crop intensity increases after rural after transformation

Opinion	Respondents
Agree	11
Strongly Agree	7
Disagree	6
Strongly disagree	5

Table 2.5: The adoption of high-value crops productivity increases in rural areas

Opinion	Respondents
Agree	12
Strongly Agree	8
Disagree	4
Strongly disagree	5

2.2.1 Research Design as Per Different Objective-wise

The main objectives of the research study are stated as follows:

2.2.1.1 To explore the transformation of agricultural land in the state of Haryana starting from 1966 to 2018.

Data source: "The study is based on secondary data taken from Statistical Abstract of Haryana, 1967-68 to 2017-18, Economic and Statistical Organization, Panchkula"

Methodology: Region wise analysis, comparison of different parameters like land use, cropping pattern, system of irrigation, crop combination analysis, ranking of crops, crop combination regions fertilizer, infrastructure facilities, the analysis will be region wise and period after

formation of Haryana starting from 1966 to 2018 decade wise average periods 1969-70-71,1989-90-91, 2009-10-11 and 2011 to 2018. Secondary data will be analyzed by percentage method to find out the relationship and cause effect between variables.

2.2.1.2 To analyze the present situation of agriculture in Haryana in terms of its productivity and cropping pattern.

Data source: Journals, statistical abstract of Haryana,1967-68 to 2017-18 and some published sources that contained information about the Agricultural background of the Haryana. The duration of the present situation is from 2013 to 2018 among districts of Haryana state.

Methodology: Region wise analysis of Agricultural productivity, cropping pattern, irrigation system, crop combination analysis, ranking of crops, infrastructure facilities, Analysis 2013-2014,2014-2015,2015-16, 2016-17 and 2017-18 periods. Simple statistical method has used to compute crop ranking and Weaver's crop combination technique in present study.

2.2.1.3 To investigate the agricultural and rural development on micro level through case studies of some selected villages.

Data source: Interview method, interview schedule on demographic aspects, socio- economic condition of the respondent.in this research will divide Haryana into Three agro-zones.

Methodology: Sampling, Random/Purposive sampling, sample to be decided fromthe results from first and second objectives. It will be done using appropriate samplingmethod and at least 286 samples shall be taken from each zone. We will make use of correlation technique, regression technique. The collected data will be compiled,tabulated and analyzed through simple frequency and per centage method.

2.2.1.4 To explore the Government policies, programs for development of agricultural and rural development and assess its impact in terms of execution.

Data source: Policies, programs for agricultural and rural area from reports.

Methodology: Review and analysis of national policies and programs (Content analysis), suggestions and recommendations for sustainable rural development as per our context. This

method includes studying of different agricultural and rural development policies implemented by the government like Fasal Bima Yojana and MNREGA. Primary data was collected through interviews in form face to face interviews with the farmers of selected villages of Haryana.

2.3 RESEARCH QUESTIONS

1. How does the agricultural land transformation occur in Haryana?
2. What are the statuses of Agricultural development in Rural Haryana?
3. What are the factors which affect the rural development in Haryana?
4. What are the current policies for the agricultural and rural development in Haryana and its impact?

2.4 HYPOTHESIS

- Ho: There is no impact of land transformation on crop pattern and productivity.
- Ho: There is no impact of land transformation on livelihood of people in Haryana.
- Ho: Rural development does not affect by land transformation.

2.5 DATA COLLECTION

The effort to collect data begins after a research problem has been characterized and the project/survey plan has been resolved. When choosing the method of data collection that will be used for the study, the researcher must remember two types of data, namely the primary and the secondary. The primary data are those that are collected again and from nothing, and consequently turn out to be unique in their character. Secondary data, on the other hand, are those that have just been collected by another person and have gone through the measurable procedure. The researcher should choose the type of data he would use (therefore, collect) forhis study and, depending on his needs, he should choose one of the two methods of data collection. Methods for collating the contrast of primary and secondary data, since primary data must be collected initially, while if an emergence of secondary data emerges, the idea of data collection work is simply that of accumulation. We represent the distinctive methods of data collection, with the advantages and disadvantages of each method.

2.5.1 COLLECTION OF DATA THROUGH INTERVIEW SCHEDULES

This method of data collection is very important, especially if there are a large number of questions. It is accepted by private individuals, research specialists, private and open associations and even by governments. In this method, a survey is done using a interview schedule. A survey consists of several printed or composite queries in a positive request on a form. The survey is sent to respondents who need to read and understand the questions and record the response in the space implied by the reason in the survey. Respondents should only answer questions.

2.6 DESCRIPTIVE STUDY OF SOCIO DEMOGRAPHICS RESPONSES

The descriptive research strives to describe, clarify and interpret the conditions of the present, that is what is. The reason for a descriptive investigation is to observe a wonder occurring in an explicit location (i) and time. A descriptive investigation concerns existing conditions, practices, structures, contrasts or connections, sustained conclusions, ongoing forms or obvious models.

A point-by-point socio-demographic data sheet was prepared based on the data assembled from the organized meeting. This data sheet was discovered exceptionally advantageous in recognizing every member in the experimental group in the explicit spacio-fleeting setting in which his identity is implied. In this manner, it decided the uncommon zone or zones which required exceptional consideration during the time spent intercession. The basic data in regards to age, sex, education, birth arrange, home condition (ordinary/broken), family monetary status, nature of youth, exploitation in youngster misuse, nature of school life, conjugal status, number of kids, association with spouse, occupation, way of life, sexuality, history of substance misuse, nature of wrongdoing submitted, term of sentence, recidivism, through the meeting and was incorporated into the socio-demographic data sheet.

This study uses second-hand data to investigate the relationship between land use, population growth and consumption in Haryana, a state in the interior of northwestern India. In 2011, the geographical area was 44,212 square kilometers, the population was 25.35 million, and the agriculture land was 4,270 (000 hectares) in Haryana. Furthermore, Haryana represents 1.3 per cent of the geographical area of India and 1.9 per cent of its population. Chandigarh, the capital of Haryana, is shared with neighboring Punjab.

The state of Haryana is flat except for a few low hills in the north and south. Except for the Yamuna River which flows along its east side, the state does not have a perennial river. Haryana has a subtropical monsoon climate, with scarce and abnormal rainfall, hot summers, strong sunshine and cold winters. The minimum temperature in January is 1 °C, and the maximum temperature in summer is 48 °C. The average annual rainfall varies from region to region, and the lowest temperature in Hisar is 42 cm (World Weather Online, 2021).

According to its agroclimatic conditions, Haryana can be divided into three homogeneous regions. These regions show significant differences in land use patterns (especially in the agricultural sector) and levels of development. There is little difference in the intensity of land use between the two places. However, agriculture in semi-arid areas is dominated by the cultivation of high-yield, high-value crops such as rice and wheat, which accounted for 58.3 per cent of the total sown. area from 1991 to 1992. On the contrary, in the same year, the arid zone Most of the cultivated area (63.4 per cent) is assigned to low-yield and low-value crops such as bajra (millet), beans, oilseeds and cotton. Therefore, there is a significant difference in the yield per hectare and the production value between the two regions (ICAR, 2021).

In contrast, it was used as a sterile and little casual land, the land used for grazing, and permanent grass, and possible cultivation, the possible raw lands decreased. A decrease in the area of land of the category Barren and Indignation (up to 4.1 per cent of the 1970s reported regions from 1970 to 2.2 per cent) is the result of landfill policy. The availability of technologies to recover the affected land of severe salinity and the city of soda can make such regeneration and economically enable. The cultivation of negotiated land for cultivation reduced the adverse effects of regional expansion in non-agricultural applications.

Changes in land use can be classified in (1) 1 categories of use in the conversion of the Earth to another category of use (for example, lands are moving from agricultural applications to non-agricultural applications. (2 Changes in land use in the AA collection of land use. Categories (for example, cultivation lands change from one crop to another). (3) Changes in the intensity of the Earth Mine (for example, the Farmers are more than once a year cultivated curled, and as a result, they increase in the resistance to cutting).

2.7 DATA ANALYSIS

Data analysis includes the inclusion of comparative, descriptive and inferential statistics. The analysis plan is carried out with the opinion of experts. The analysis will be based on the objectives and hypotheses to be tested, the analysis to be tested and the analysis of the

planned data to organize and present the following aspects.

- **Section 1:** Distribution of study subjects according to the transformation of agricultural land in the state of Haryana starting from 1966 to 2018 as average period's wise 1969-70-71, 1989-90-91, 2009-10-11 and 2013 -2018.
- **Section 2:** Area wise comparison during given period from 2015 to 2018 by using mean, standard deviation.
- **Section 3:** Comparison between socio-economic factors for agricultural and rural development on micro level with case studies of some selected sample villages as criterion by using frequency and per centage.
- **Section 4:** Evaluate the effectiveness of major policies, programs of agricultural and rural development in the study area with impact of its implementation.
- **Section 5:** To find out association of with selected socio-demographic variables and present situation of agriculture in terms of productivity and cropping pattern development, land transformation on livelihood of people in Haryana.

2.7.1 Sampling Methods

In each of districts, 286 farmers were interviewed randomly drawing from as many villages as possible to gather information from widest possible geographical area of the district. Thus, a total sample of 286 farmers was interviewed through multi stage stratified random and snowball sampling method. The farmers were canvassed to the structured interview schedules to collect data related to area operated, cropping pattern, economics of the crops cultivated, activities allied to agriculture, etc. The information related economics of crops and allied activities were asked from the sampled respondents in detail.

2.7.2 RELIABILITY AND VALIDITY TEST

Cronbach Alpha is a reliability test carried out in SPSS to measure internal consistency, that is, the reliability of the measurement tool (interview schedule). It is most commonly used when developing interview schedules using different instructions on the Likert scale, so it can be determined whether the scale is reliable.

2.8 STATISTICAL TECHNIQUES FOR DATA ANALYSIS

The study uses accompanying factual measures to examine the data to arrive at results. The proportion of descriptive measures, such as average, per centage, frequency, etc. Completed measurable exams using SPSS 16.0 General Perceived Factual Scheduling. Microsoft Word and Microsoft Excel are used to make charts and tables. Descriptive measures such as average, per centage, frequency have been used to represent demographic aspects as well as experimental and control groups.

CHAPTER 3
TRANSFORMATION OF AGRICULTURAL LAND IN THE STATE OF HARYANA

3.1 INTRODUCTION

The share of agriculture in the State Gross Domestic Product (SGDP) rose significantly in the subsequently years, as discussed in the previous chapter, and a larger share of SGDP is derived from agro-based farming, horticulture, agro-forestry and dairy based sectors (Haryana State Agricultural Policy, 2014). Paddy, wheat, sugarcane, cotton, oilseeds, gram, barley and millet contribute to the state's economy of being ranked as the second largest food basket of India. Among others, however wheat and paddy remain the major crops. Favorable physical conditions, integrated state and farmer's efforts to introduce improved farming techniques have yielded favorable returns.

As agriculture is one of the greatest economic exercises in India, regulations have been figured out to safeguard the country's fruitful grounds. To this end even the people who own such agriculture land in India, are not allowed to involve it for some other reason - private, business, or modern. To involve his farmland for a movement that doesn't fall in the class of agriculture action, a due lawful cycle must be followed, to change over the land for that specific use. This cycle is officially known as land-use change.

3.2 LAND USE OF HARYANA

The total area under agriculture in Haryana has decreased by 2.93 per cent after the decades of 1960s. Since 1966-67 to 2017-18 the net area land for agricultural used decreased whereas use of land in non-agriculture was also decreased by 51.73 per cent gradually. Similarly, with the use of land in forest also decreased by 40.66 per cent. "The main reason behind this is the inclusion on 14 Haryana districts in the Delhi NCR reason under the with the approval of the participating states of Haryana, Rajasthan, and Uttar Pradesh, the Union Parliament passed the National Capital Region Planning Board Act in 1985, establishing the NCR Planning Board, which is directly responsible for urbanization. (Ministry of Housing and Urban Affairs, Government of India, 2017)".

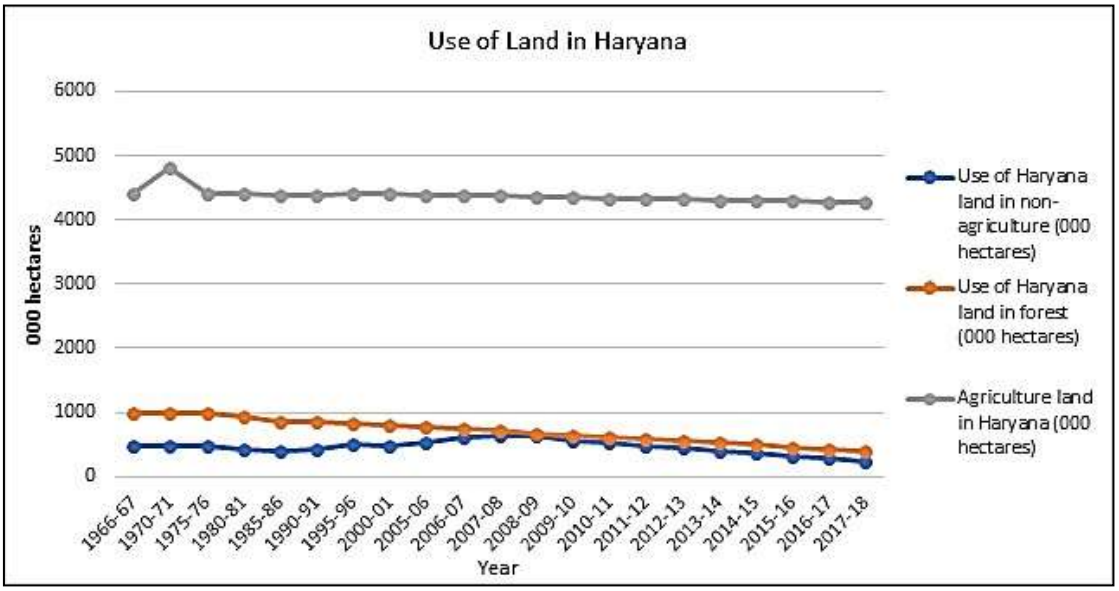
Table 3.1: Agriculture Classification of Area in Haryana State, per centage of Area under different Land use

Years	Fallow Land (per cent)	"Other uncultivated land excluding Fallow Land (per cent)"	"Land not available for Cultivation (per cent)"	Total area according to village papers (000 hectares)
1966-67	83.70	3.11	13.18	4,399
1970-71	81.53	2.04	16.43	4,802
1975-76	85.13	1.77	13.10	4,404
1980-81	85.79	1.36	12.85	4,405
1985-86	86.11	1.18	12.71	4,391
1990-91	85.52	1.10	13.39	4,378
1995-96	85.08	1.18	13.73	4,398
2000-01	85.37	1.34	13.29	4,402
2005-06	85.57	1.56	12.88	4,372
2006-07	84.74	2.38	12.88	4,372
2007-08	84.77	1.51	13.72	4,372
2008-09	84.33	1.67	14.00	4,371
2009-10	84.37	1.58	14.05	4,371
2010-11	83.36	1.46	15.17	4,370
2011-12	83.78	1.46	14.76	4,371
2012-13	83.14	1.28	15.63	4371
2013-14	82.82	1.14	16.04	4,371
2014-15	83.05	1.24	15.72	4,371
2015-16	83.20	1.33	15.48	4,374
2016-17	84.63	1.56	13.82	4,372
2017-18	84.51	1.81	13.68	4,371

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Table 3.1 depicts the per centage of Area under different Land use in the state of Haryana. The fallow land in Haryana was 83.7 per cent in the year 1966-67 which was increased by 0.81 per cent point in the year 2017-18 (84.51 per cent). The other uncultivated land excluding Fallow Land was 3.11 percentage of the total area in the year 1966-67 according to village and it was decreased to 1.3 per cent point in the year 2017-18 (1.81 percentage). The land not available for cultivation was 13.18 percentage of the total area in the year 1966-67 and it was slightly increased by 0.5 per cent points in the year 2017-18 (13.68). The total area according to the village papers was 4399 (000 ha) in the year 1966-67 and it was slightly increased by 28 (000 ha) in the year 2017-18.

Figure 3.1: Use of land in Haryana (000 hectares)



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

3.3 TYPE OF LAND HOLDING IN HARYANA STATE

There are three types of land holding in Haryana such as individual holding, Joint holding and Industry holding.

Table 3.2: Type of land holding for different purposes in Haryana (% hectares)

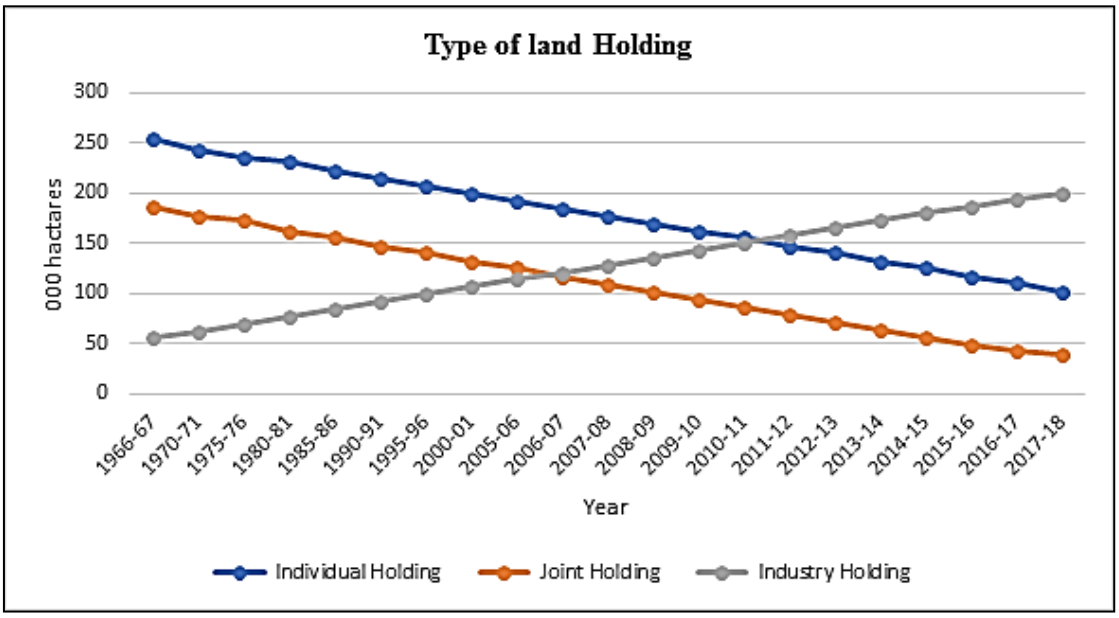
Year	Individual Holding (%) hectare	Joint Holding (%) hectare	Industry Holding (%) hectare
1966-67	51.21	37.50	11.29
1970-71	50.42	36.67	12.92
1975-76	49.37	35.98	14.64
1980-81	49.15	34.47	16.38
1985-86	48.05	33.55	18.40
1990-91	47.36	32.38	20.26
1995-96	46.41	31.39	22.20
2000-01	45.56	30.07	24.37
2005-06	44.55	29.00	26.45
2006-07	43.74	27.66	28.61
2007-08	42.75	26.33	30.92
2008-09	41.67	25.00	33.33
2009-10	40.60	23.56	35.84
2010-11	39.54	22.19	38.27
2011-12	38.28	20.57	41.15
2012-13	37.23	18.88	43.88

2013-14	35.87	17.39	46.74
2014-15	34.63	15.51	49.86
2015-16	33.14	13.88	52.97
2016-17	31.79	12.43	55.78
2017-18	30.00	11.47	58.53

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18

Table 3.2 depicts the type of land holding in Haryana for different purposes from 1966-67 to 2017-18. The individual land holding in the year 1966-67 was 51.21 per cent of the total land holding and it was decreased by 21 per cent point and remained to 30 per cent in the year 2017-18. The joint land holdings in the year 1966-67 was 37.50 and it was also decreased by 26 per cent and remained to 11 per cent in the year 2017-18 but industry land holdings were 11.29 per cent in the year 1966-67 and it was increased by 47 per cent to come up 58.53 per cent in the year 2017-18. So basically, industries land holding increased at a huge rate and because of this the agriculture land in the state of Haryana was decreased.

Figure 3.2: Type of land holding for different purposes in Haryana (000 hectares)



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

3.4 DISTRICT WISE AGRICULTURAL AREA REPARTITIONED

In Haryana, agricultural area was reparteed as par permission commission of state. Bhiwani, Faridabad, Kaithal, Panipat, Rewari and Yamunanagar were reparteed; these districts got the agricultural land from the native district.

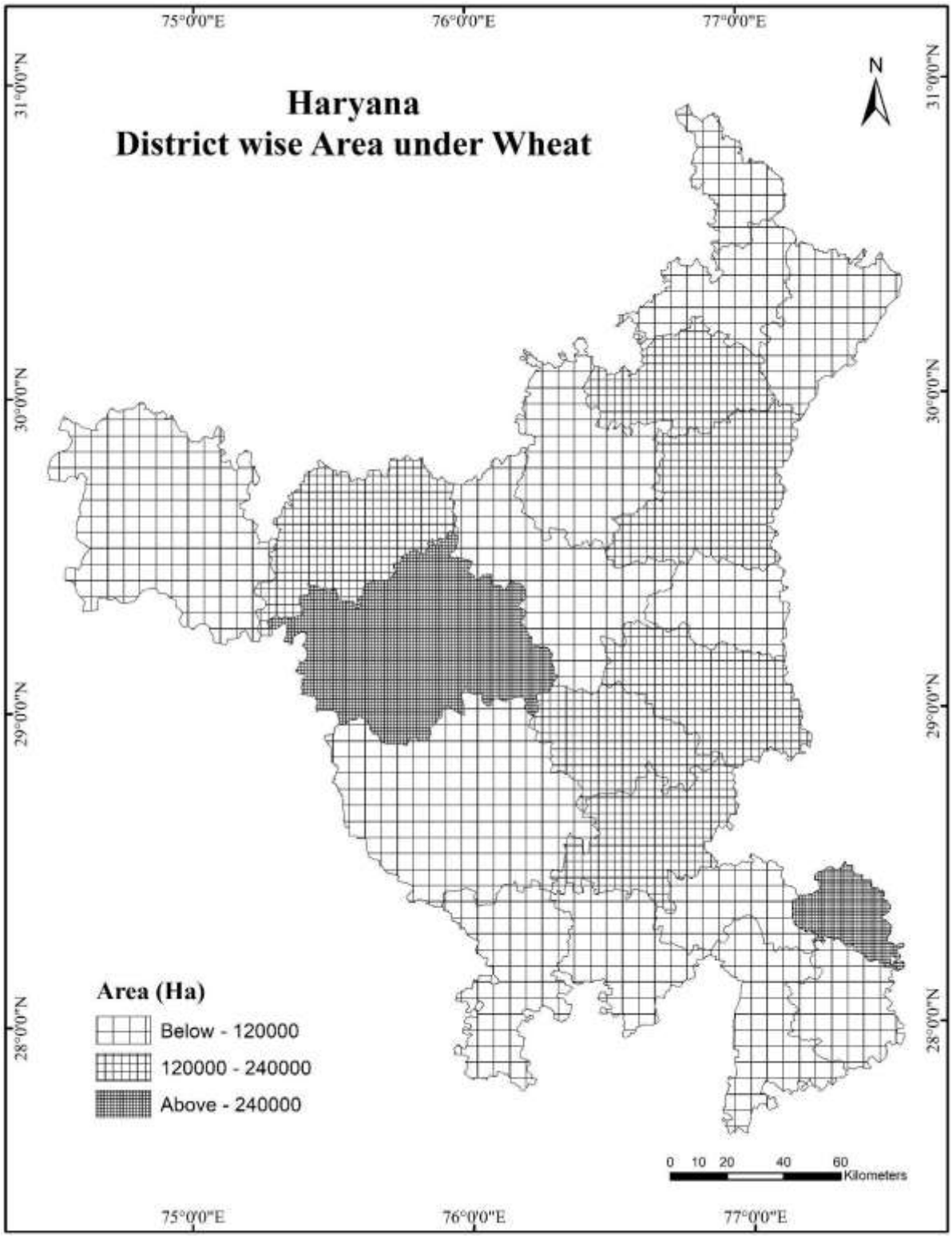
Table 3.3: Region wise/District Wise Agriculture area in Haryana

Agricultural Area repartitioned (000 Hectare)			
District	1969-1971	1989-1991	2009-2011
Ambala	338	365	366.37
Bhiwani	**	543	9,647.62
Faridabad	**	—	560.421
Gurugram	574	450	412.03
Hisar	1,236	1619	1622.11
Jind	239	325	325
Kaithal	**	**	3.14
Karnal	759	355	359.461
Kurukshetra	**	368	368.1
Mahendragarh	280	284	284
Panipat	**	**	10.4
Rewari	*		*
Rohtak	565	341	342
Sirsa	**	320	322.02
Sonipat	*	207	207
Yamunanagar	**	**	581.06

Source: Director, Land Records, Haryana.

*Note: *, **: district was not formed*

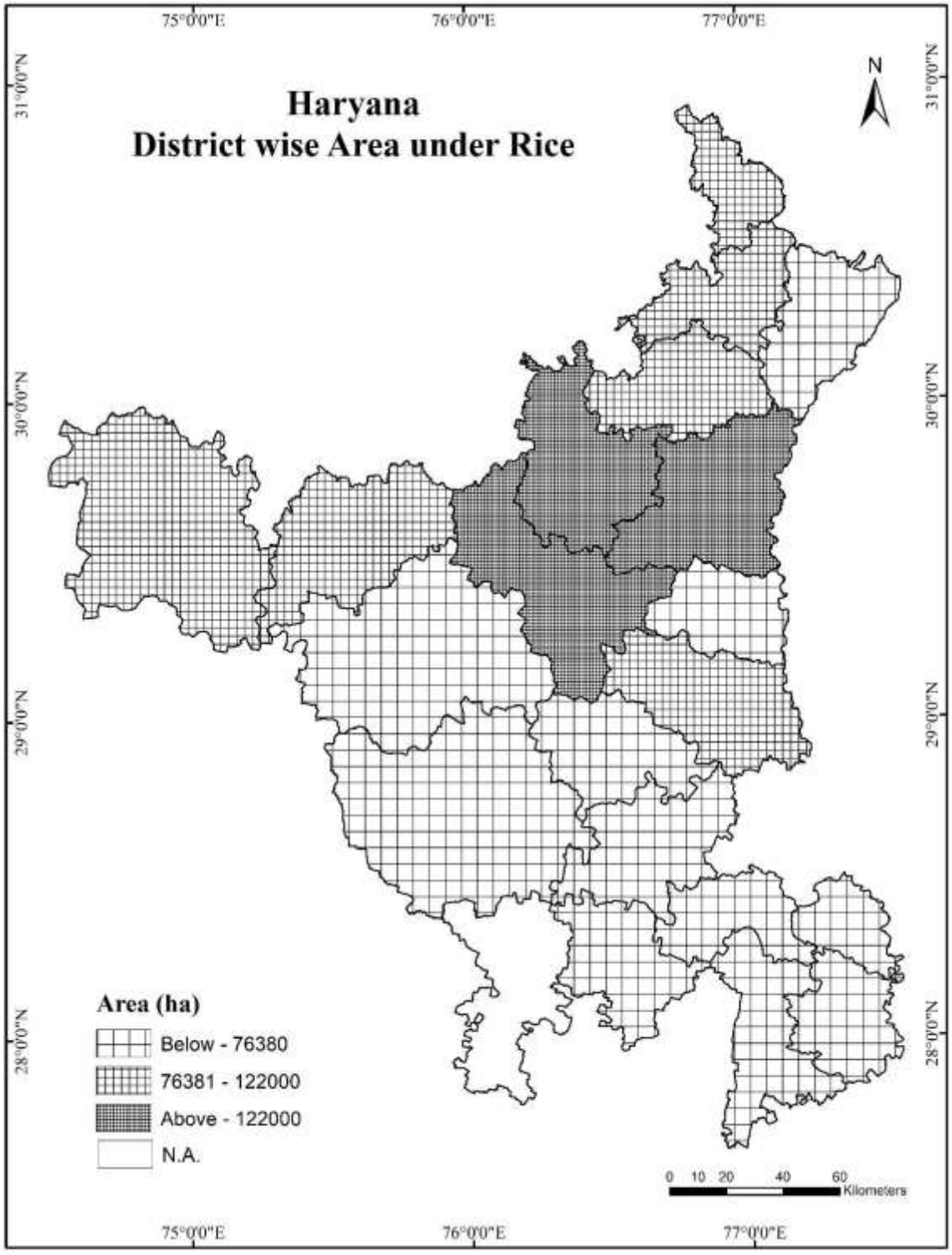
Table 3.3 shows the districts/region wise agriculture area in Haryana from 1969-71, 1989-91 and 2009-11. Data of some districts were not available for initial year as the districts were not formed.



Map 3.1: District Wise Area Map of Wheat

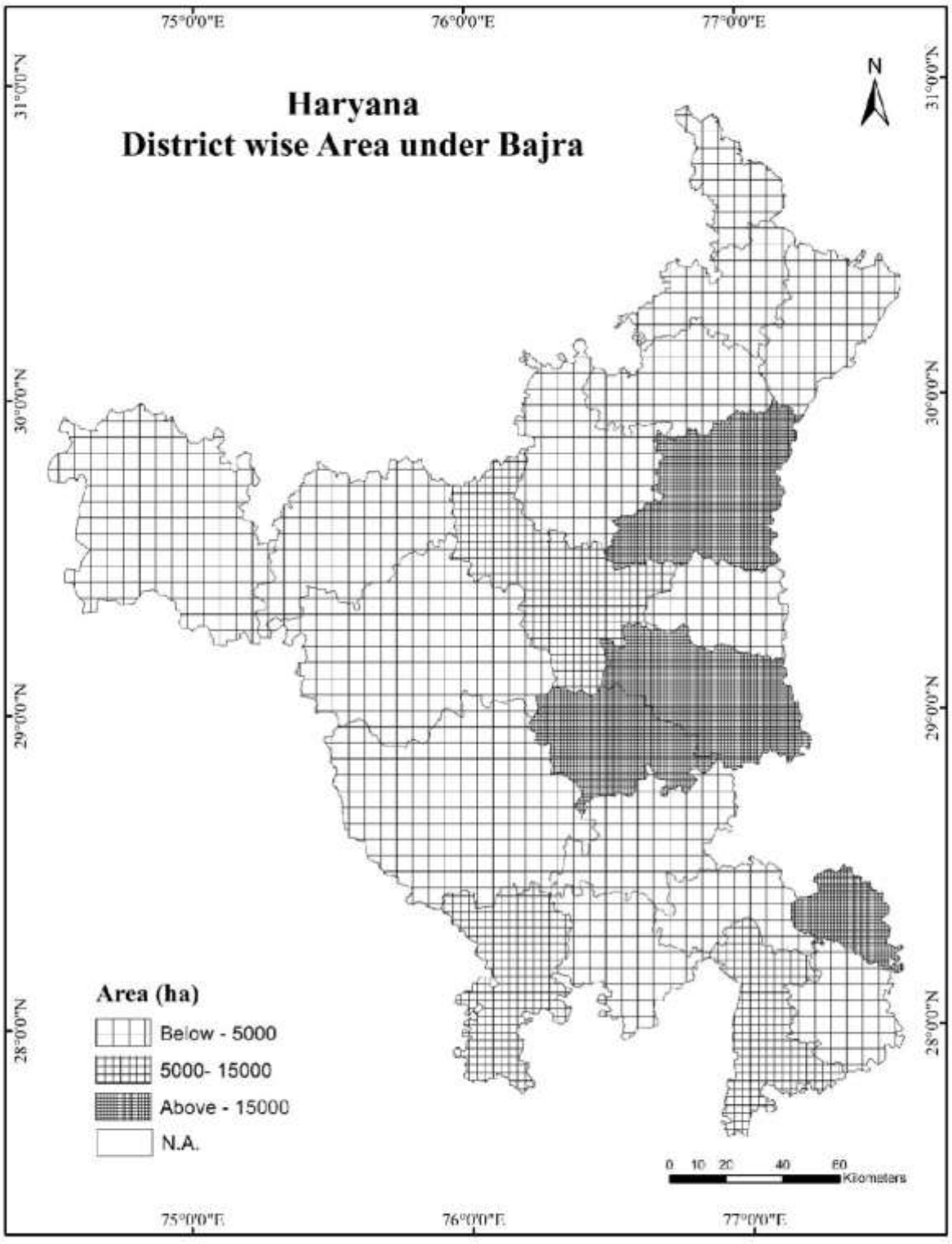
Source: Statistical Abstract of Haryana from 2017 to 2018.

Map 3.2: District Wise Area Map of Rice



Source: Statistical Abstract of Haryana from 2017 to 2018.

Map 3.3: District Wise Area Map of Bajra



Source: Statistical Abstract of Haryana from 2017 to 2018.

3.5 DIFFERENT LAND USED IN HARYANA

Haryana has developed agricultural and industrial sectors, rapid economic growth, and its per capita income ranks third among the sixteen major states in India. The outstanding agricultural development in Haryana is mainly attributed to the Green Revolution. It was initiated between 1967 and 1978, leading to the intensification and expansion of agriculturein many developing countries, and achieved great success in India. In Decade wise analysis, barren and unculturable uses and forests uses land were decreasing. Net area sown, cultural area, area sown more than once were increased. It showed positive correlation.

Table 3.4: Different Land Used in Haryana

Area (000 Hectare)	1969-1971	1989-1991	2009-2011
Total area according to village papers	4399	4802	4371
Forests	91	99	39
Land put to non-agricultural uses	257	309	522
Barren and unculturable land	232	181	102
Total	489	490	624
Net area sown	3423	3565	3518
Culturable area	3819	3813	3681
Area sown more than once	1176	1392	2987
Total cropped area	4599	4957	6505

Source: Director, Land Records, Haryana.

Table 3.4 shows that the different land used in Haryana for the year 1969-71, 1989-91 and 2009-11. The total area according to village paper was 4399 (000 Hectare) in the year 1969-71 and in the year 1989-1991 it was increased by 403(000 Hectare) and in the year 2009-11 it was again decreased with 403 (000 Hectare) and come up with 4371 (000 Hectare). The total area of forests in the state of Haryana was 91 (000 Hectare) in the year 1969-71 and it was increased by 8 (000 Hectare) in the year 1989-91 but after that it was drastically decreased by 60 (000 Hectare) and remained to 39 (000 Hectare) in the year 2009-11. The total area of land put to non-agricultural uses was 257 (000 Hectare) in the year 1969-71, and after that it kept increasing from 1989-91 and 2009-11 with 52 (000 Hectare) and 213 (000 Hectare) respectively. The net sown area was 3423 (000 Hectare) in the year 1969-71 and then it was increased by 142 (000 Hectare) (3563 000 Hectare) and then decreased by 47 (000 Hectare) to remain at 3518 (000 Hectare) in the year 2009-11. The culturable area was 3819 (000 Hectare) in the year 1969-71 and then it was decreased by 6 (000 Hectare) (3813 000 Hectare) and then again decreased by 132 (000 Hectare) to remain at 3681 (000 Hectare) in the year 2009-11. The area sown more

than once was 4599 (000 Hectare) in the year 1969-71 and then it was increased by 358 (000 Hectare) (4957 000 Hectare) and then again increased by 1548 (000 Hectare) to come up with 6505 (000 Hectare) in the year 2009-11.

3.6 GEOGRAPHICAL ANALYSIS FOR LAND, CROP AND IRRIGATION PATTERN ANALYSIS FOR INDEXING THE DISTRICT

3.6.1 Land Area under Forest

In Haryana, "Yamunanagar district has more land under forest area which area has 269614 hectare square, than Panchkula district has forest area which area has 147220-hectare square. Similarly, Mewat and Jhajjar have the least land under forest area which area are 4795 hectares and 7652-hectare square.

3.6.2 Land Area under Non – Agricultural uses or Barren Land

In Haryana, Bhiwani, Hisar districts have more land area under non- agricultural uses which area 869189 and 822608 hectare square, than Yamunanagar district has land area under nonagricultural uses which area has 605418-hectare square. Similarly, Sirsa and Palwal have the least land area under non – agricultural uses which area is 340169 and 148018-hectare square".

3.6.3 Land Area under Net Area shown

In Haryana, Bhiwani and Sirsa districts have more land area under Net Area shown which area 7880315 and 7701221 hectare square, than Hisar district has land area under Net area shown which area has 6774479-hectare square. Similarly, Panchkula and Palwal have the least land area under Net area shown which area are 641219 and 1045877-hectare square.

3.6.4 Canal as Irrigation System

Sirsa, Hisar and Jind are the district of Haryana which has more land area for canal for irrigation in the crop and similarly Ambala, Panchkula have less land area for canal for irrigation of crop.

3.6.5 Tube well as Irrigation System

Kaithal, Kurukshetra and Karnal are the district of Haryana which use more tube well for irrigation in the crop and similarly Rohtak, Mewat and Palwal have use a smaller number of

tube-well irrigation of crop.

3.6.6 Other Sources as Irrigation System

Sirsa, Hisar, Bhiwani and Karnal are the district of Haryana which use more other sources such as well tanks, other wells and gross canal for irrigation in the crop and similarly Mewat and Palwal have use a smaller number of other sources irrigation of crop.

3.7 SUMMARY

After Green Revolution the agriculture sector shoots up rapidly initially but the total area under agriculture in Haryana has decreased after the decades of 1960s. Since 1966-67 to 2017-18. The net area land for agricultural used decreased whereas use of land in non- agriculture was also decreased gradually. Similarly, the forest land also decreased. The main reason behind this is the inclusion on 13 Haryana districts in the Delhi NCR reason under the with the approval of the participating states of Haryana, Rajasthan, and Uttar Pradesh, the Union Parliament passed the National Capital Region Planning Board Act in 1985, establishing the NCR Planning Board, which is directly responsible for urbanization. (Ministry of Housing and Urban Affairs, Government of India, 2017). The rise of urbanization as IT hub in Gurugram and Faridabad district make huge concrete jungle which ultimately transformthe land.

CHAPTER 4

AGRICULTURE CHANGES IN HARYANA IN TERMS OF CROPPING PATTERN AND PRODUCTIVITY.

4.1 Haryana Net Area Sown Starting from 1966 to 2018

The total area under cropping in Haryana has witnessed overwhelming rise after the decades of 1960s. The below table shows that in the last five decades there has been a significant rise in the area brought into intensive agricultural usage. Since 1966-67 to 2017-18 the net areas sown grew by 2.89 per cent whereas area sown more than once grew phenomenally by 167 per cent. Similarly, with the onset of green revolution cropping concentration intensified. "The trend of crop intensity is still continuing; however, it has reached to almost saturation level of 83 per cent of the net cropped area of the state.

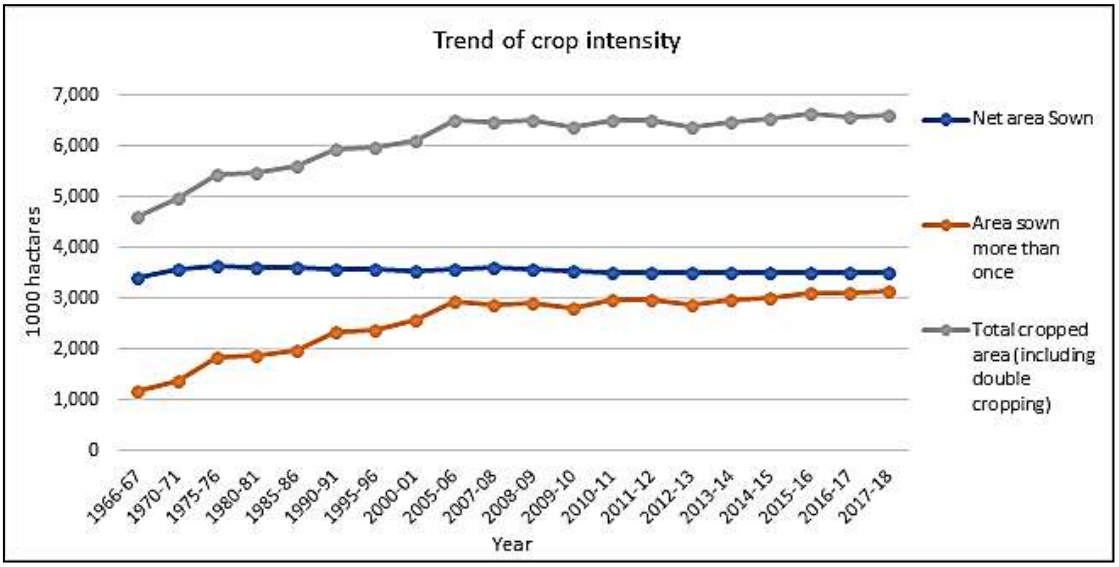
Table 4.1 Trend of Haryana Net Area Sown (000 hectares)

Year	Net area Sown (%)	Area sown more than once (%)	Total cropped area (including double cropping) (000 Hectare)
1966-67	74.4	25.6	4,599
1970-71	71.9	28.1	4,957
1975-76	66.5	33.5	5,451
1980-81	65.9	34.1	5,462
1985-86	64.5	35.5	5,601
1990-91	60.4	39.6	5,919
1995-96	60.0	40.0	5,974
2000-01	57.7	42.3	6,115
2005-06	54.8	45.2	6,509
2007-08	55.7	44.3	6,458
2008-09	55.0	45.0	6,500
2009-10	55.9	44.1	6,351
2010-11	54.1	45.9	6,505
2011-12	54.1	45.9	6,489
2012-13	55.1	44.9	6,376
2013-14	54.0	46.0	6,471
2014-15	53.9	46.1	6,536
2015-16	53.2	46.8	6,621
2016-17	53.4	47.2	6,581
2017-18	53.2	47.6	6,605

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Table 4.1 depicts trend of Haryana net area sown (000 hectares) from 1966-67 to 2017-18. In 1966-67 the net sown area was 74.4 per cent of the total cropped area and it was decreased by 21 per cent point to 53.2 per cent in 2017-18. The area sown more than once was 25.6 per cent of the total cropped area and it was increased by 22 per cent points to 47.6 per cent in 2017-18. The total cropped area was 4599 (000 Hectare) in 1966-67 and it was increased by 2006 (000 Hectare) to 6605 in the year 2017-18.

Figure 4.1: Trend of crop intensity in Haryana (000 hectares)



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

4.2 Total Cropped Area in Haryana State

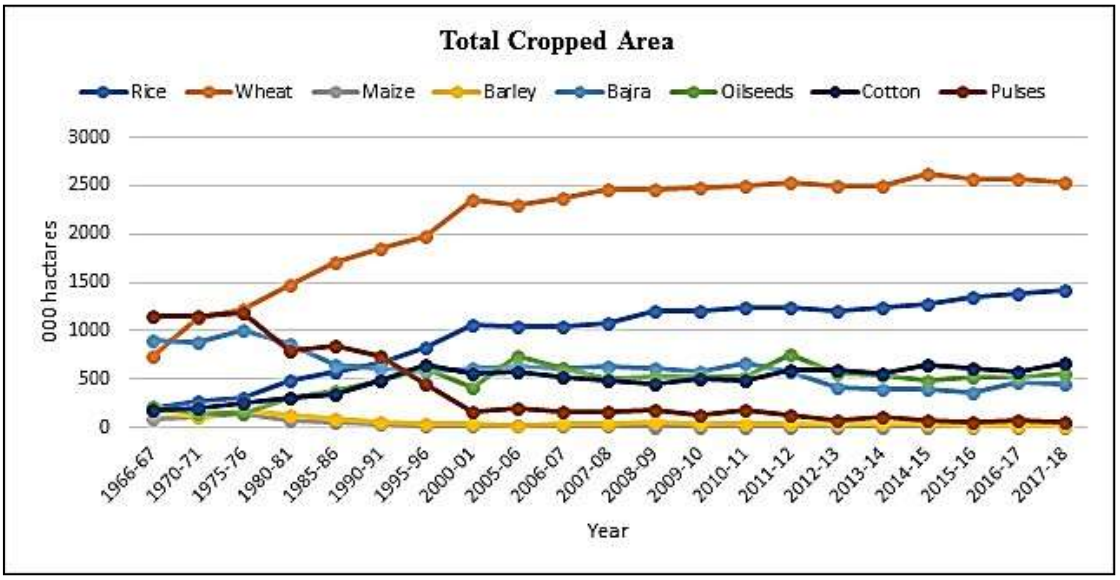
Table 4.2 Total Crop Area (000 hectares)

Year	Rice	Wheat	Maize	Barley	Bajra	Oilseeds	Cotton	Pulses
1966-67	192	743	87	182	893	212	183	1150
1970-71	269.2	1129.3	114.4	108.6	879.6	142.6	193.4	1158.9
1975-76	303.5	1226	138.7	177.1	1005.6	153.5	255	1193.9
1980-81	483.9	1479	71.3	124.5	870.3	311.2	316.2	794.8
1985-86	584	1701.3	54.9	87.7	649.5	380.1	344.1	846.3
1990-91	661.2	1850.1	34.8	50.5	608.6	488.5	490.6	742
1995-96	830	1972.1	26	40.6	575.2	611	651.8	449.8
2000-01	1054	2354.8	15.4	44.1	608.3	414	555.4	157
2005-06	1046.6	2302.7	17.5	28.2	631	735.8	583.8	195.3
2006-07	1042	2377.1	13.4	37.7	619	616.2	527.7	169.3
2007-08	1072.5	2460.7	13.8	39.5	628	511.3	482.5	172
2008-09	1211.2	2461.4	11.8	53	612.9	527.6	456.1	184.1
2009-10	1206.4	2487.7	12.2	42.1	583.8	523	505.1	131.6

2010-11	1243.3	2504	9.6	37.3	659.6	521	493.3	175.6
2011-12	1234.1	2531.3	11	41.2	576.2	754.8	601.8	123
2012-13	1206.3	2496.9	9.9	47.7	410.7	567.6	592.6	75.3
2013-14	1244.6	2499.1	8.5	38.6	403.6	548.5	567.8	105.3
2014-15	1277.9	2628.1	8.8	35.3	393.8	495.4	647.2	83.8
2015-16	1353.1	2575.6	6.1	28.9	369.9	526.8	615.2	63.3
2016-17	1385.2	2564	6.2	20	467.1	523	571.2	67.5
2017-18	1422	2530.5	6.4	20.2	449.3	559.6	668.5	56.6

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Figure 4.2: Total Cropped Area (000 hectares)



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

4.3 TOTAL PRODUCTION OF CROPS IN HARYANA STATE

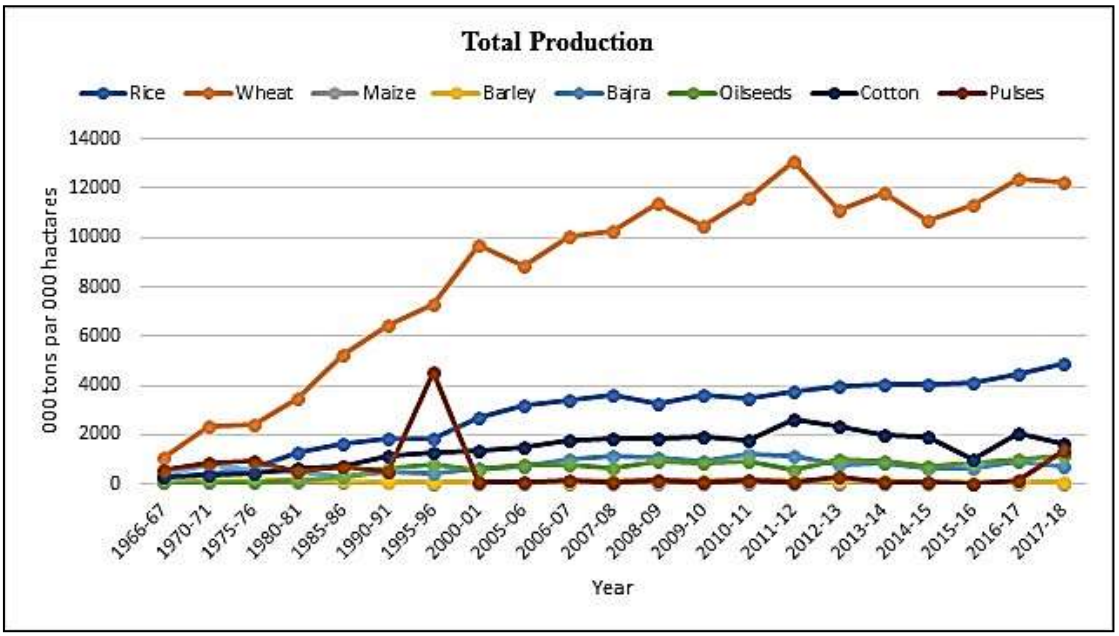
Table 4.3: Total production (000 hectares) of crop

Year	Paddy	Wheat	Maize	Barley	Bajra	Oilseeds	Cotton	Pulses
1966-67	223	1059	86	239	373	92	287	563
1970-71	460	2342	130	124	826	99	373	832
1975-76	625	2428	171	221	608	79	465	952
1980-81	1259	3490	81	181	474	188	643	503
1985-86	1633	5260	64	160	315	288	745	687
1990-91	1834	6436	49	107	526	638	1155	542
1995-96	1847	7291	48	100	409	783	1284	4511
2000-01	2695	9669	34	118	656	563	1383	100
2005-06	3194	8853	36	79	706	822	1502	112
2006-07	3375	10059	30	115	1021	821	1805	136
2007-08	3606	10232	37	120	1156	617	1882	101
2008-09	3299	11360	25	185	1087	911	1862	178

2009-10	3628	10488	26	137	930	862	1918	97
2010-11	3465	11578	19	130	1183	965	1747	153
2011-12	3757	13119	30	149	1175	546	2621	107
2012-13	3941	11117	26	167	791	970	2378	286
2013-14	4041	11800	24	151	829	899	2025	91
2014-15	4007	10707	18	105	670	740	1943	55
2015-16	4144	11351	18	99	651	852	995	35
2016-17	4453	12384	26	73	964	985	2041	162
2017-18	4880	12263	19	69	721	1135	1626	1328

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Figure 4.3: Total production (000 hectares) of crop



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

4.4 Total Area for Production versus Tones of Production of Crops in Haryana State

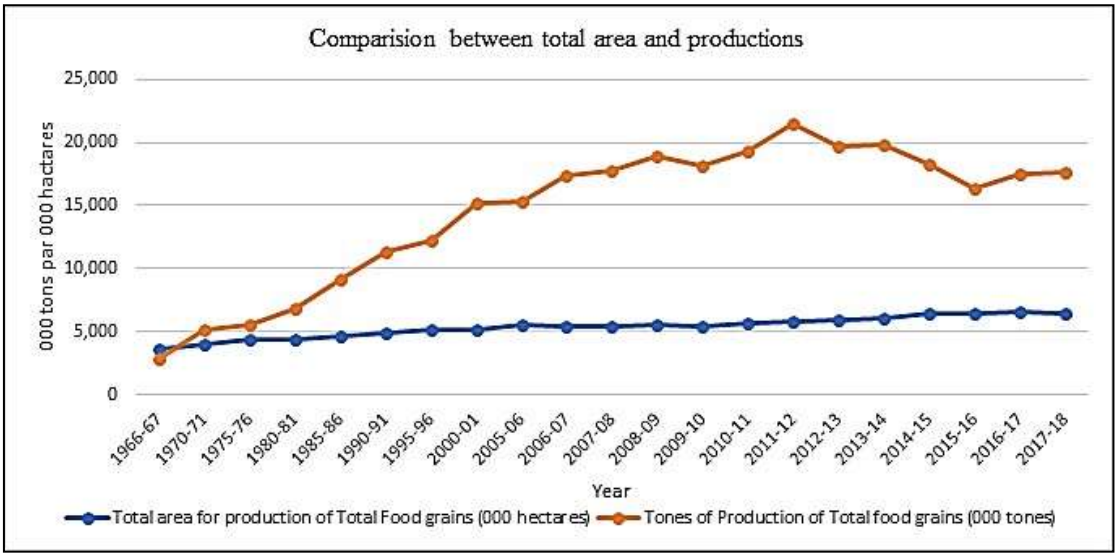
The table no. 4.4 shows positive correlation between the total areas for production of crop with tones of production of crops in the state. Therefore, total cropped area and overall production of various crops in Haryana reflect consistent expansion and dominance of paddy and wheat in the state. On the other hand, barley, bajra, maize and pulses have witnessed drastic downfall in the overall production and total area cropped throughout the last forty-nine years.

Table 4.4 Comparison of Total area and tones of production (000 hectares)

Year	Total area for production of Total Food grains (000 hectares)	Tones of Production of Total food grains (000 tones)
1966-67	3,642	2,922
1970-71	3,996	5,186
1975-76	4,453	5,549
1980-81	4,451	6,818
1985-86	4,648	9,151
1990-91	4,926	11,287
1995-96	5,157	12,213
2000-01	5,203	15,218
2005-06	5,541	15,304
2006-07	5,402	17,362
2007-08	5,380	17,751
2008-09	5,518	18,907
2009-10	5,492	18,086
2010-11	5,644	19,240
2011-12	5,873	21,504
2012-13	5,907	19,676
2013-14	6,115	19,860
2014-15	6,509	18,244
2015-16	6,505	16,305
2016-17	6,578	17,450
2017-18	6,452	17,630

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Figure 4.4 Comparison of Total area and tones of production (000 hectares)



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18

4.5 CROP PATTERNS IN HARYANA

The cropping pattern in Haryana has changed considerably over the time period as the share of area under food grains in gross cropped area (GCA) has increased marginally from 4311.4 thousand hectares in 1969-71 to 4481.7 thousand hectares in 2009-11". Decrease in area under coarse cereals and pulses were mainly responsible for that. Yielding varieties of seeds, irrigation facilities, and subsidies on chemical fertilizers were provided to the farmers. As a result, the farmers were shifted towards rice and wheat from coarse cereals and pulses in Haryana as Haryana is one of the states which were highly affected by the green revolution.

Table 4.5: Crop Patterns in Haryana

		1969-1971	1989-1991	2009-2011
Rice	Area	231	659	1214
	Production	342	1832	3601
	Yields	1429	2474	2967
Jowar	Area	239	133	72
	Production	53	61	31
	Yields	229	418	444
Bajra	Area	886	715	554
	Production	600	738	847
	Yields	679	993	1557
Maize	Area	101	52	11
	Production	108	63	24
	Yields	1065	1384	2284
	Area	936	1919	2461

Wheat	Production	1701	5811	10594
	Yields	1750	3264	4292
Barley	Area	145	67	31
	Production	182	114	103
	Yields	1232	1894	3250
Gram	Area	1063	599	95
	Production	660	371	70
	Yields	621	763	718
Mash	Area	8	7	2
	Production	3	4	1
	Yields	384	376	409
Moong	Area	18	9	18
	Production	7	4	8
	Yields	377	534	493
Massar	Area	31	17	4
	Production	12	11	3
	Yields	379	578	924

Source: Director, Land Records, Haryana.

Note: Area in 000 hectares; Production in 000 tones; Yields in kg per hectare

4.6 Crop Combination Regions in Haryana

The study of crop combination of any region gives us the relative position of crops at regional level. The pattern of crop combination in a region emerges due to various price and non- prices factors. Such analysis would minimize the chances of over simplified generalization. Crop combination study can be greatly helpful for regional agricultural planning and optimizing income of farmers. Districts Bhiwani, Hisar and Sirsa have 5 crop combinations, similarly, Gurugram, Jhajjar, Jind, Mahendragarh, Rohtak and Sonipat have 4 crop combinations.

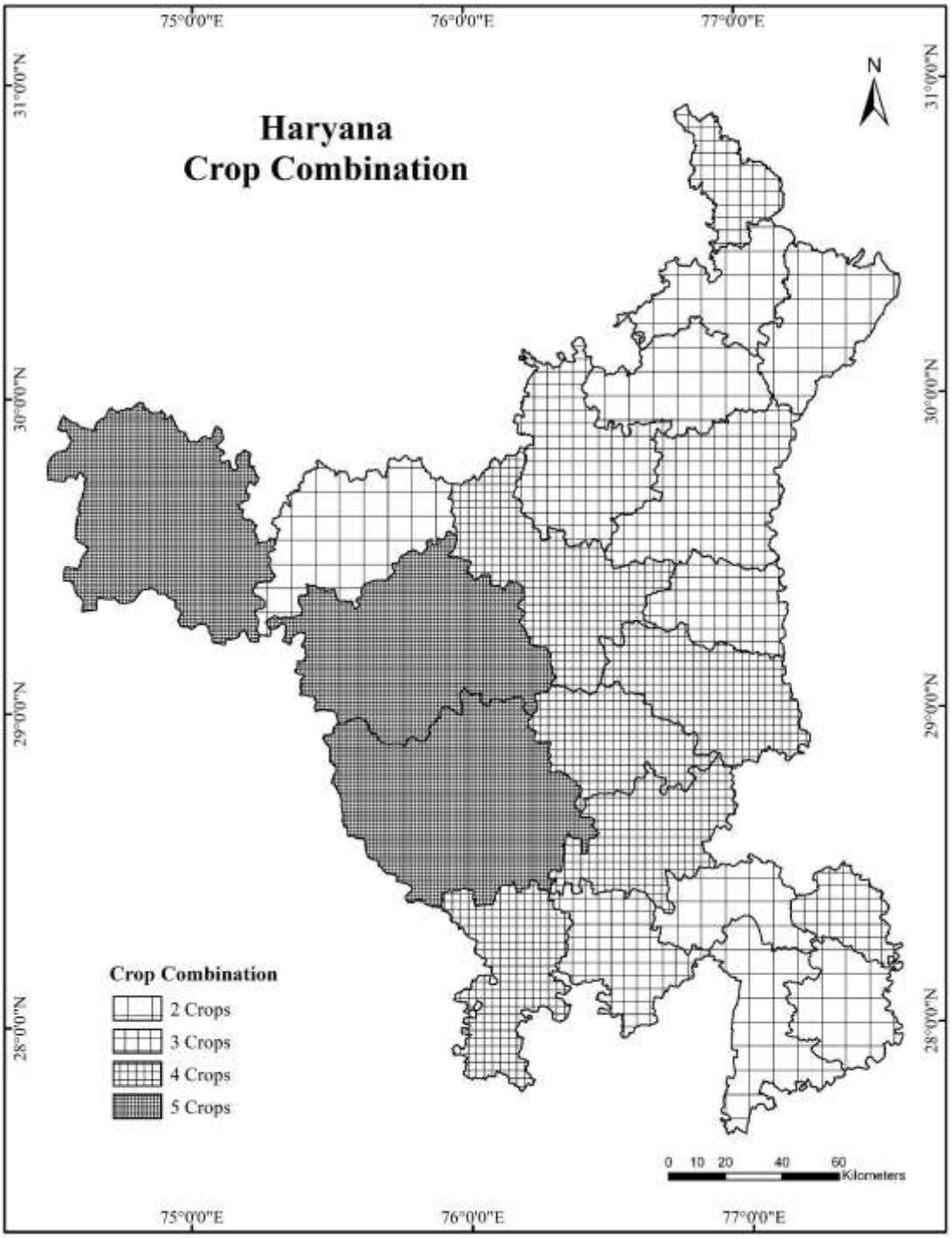
Table 4.6 Crop combination regions in Haryana

District	Crop Combination	Crops
Ambala	2	Rice, Wheat
Bhiwani	5	Wheat, Gram, Barley, Bajra, Rice
Faridabad	3	Wheat, Rice, Jowar
Fatehabad	2	Wheat, Rice
Gurugram	4	Wheat, Rice, Jowar, Bajra
Hisar	5	Wheat, Rice, Bajra, Barley, Gram
Jhajjar	4	Wheat, rice, Jowar, Bajra

Jind	4	Wheat, Rice, Bajra, Barley
Kaithal	3	Rice, Wheat, Bajra
Karnal	3	Rice, Wheat, Bajra
Kurukshetra	2	Rice, Wheat
Mahendragarh	4	Wheat, Barley, Gram, Bajra
Panchkula	3	Wheat, Rice, Maize
Panipat	3	Wheat, Rice, Bajra
Rewari	3	Wheat, Bajra, Barley, rice
Rohtak	4	Wheat, Rice, Jowar, Bajra
Sirsa	5	Wheat, Rice, Barley, Gram, Bajra
Sonipat	4	Wheat, rice, Jowar, Bajra
Yamunanagar	2	Wheat, Rice

Source: Statistical Abstract of Haryana 2017-18

Map 4.1: Crop combination regions in Haryana



Source: Statistical Abstract of Haryana 2017-18

4.7 Trend in Yields of Major Crops (in 000 tones) in Haryana State

The positive relation as all variety of crops has average increasing yields. The food grains crop such as rice and wheat have increasing order of production in Haryana state. In other hand commercial crop such bajra, barley and cotton have witnessed drastic increased in the overall production. On the other hand, oils crop such as sunflower and Tori have also witnessed of increasing in the overall production.

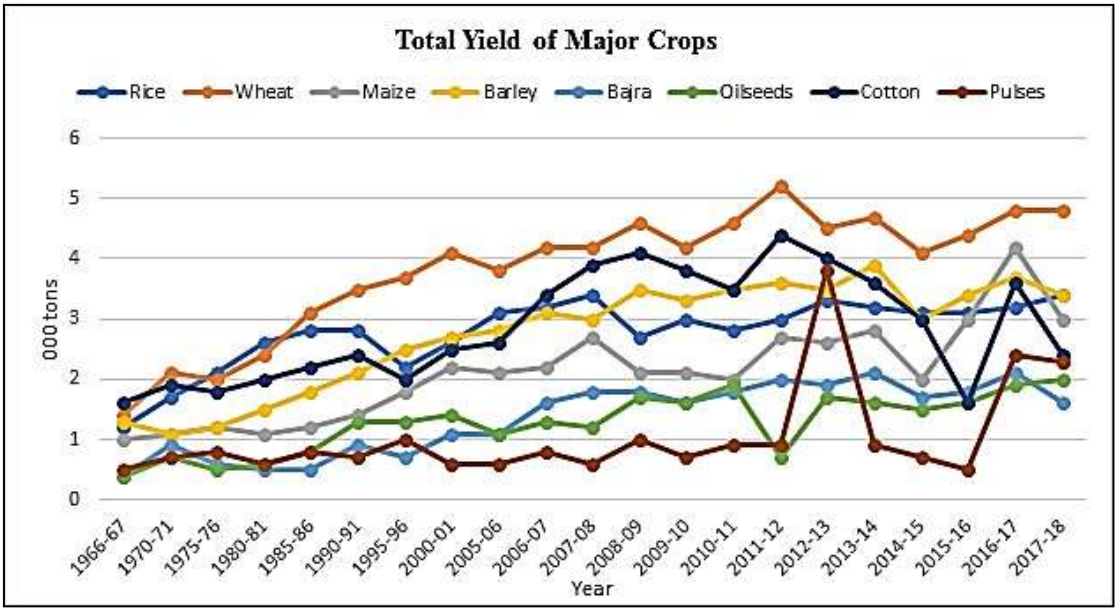
Table 4.7 shows that the averages yield par hectares of different types of crops in the state of Haryana from 1966-67 to 2017-18

Year	Paddy	Wheat	Maize	Barley	Bajra	Oilseeds	Cotton	Pulses
1966-67	1.2	1.4	1	1.3	0.4	0.4	1.6	0.5
1970-71	1.7	2.1	1.1	1.1	0.9	0.7	1.9	0.7
1975-76	2.1	2	1.2	1.2	0.6	0.5	1.8	0.8
1980-81	2.6	2.4	1.1	1.5	0.5	0.6	2	0.6
1985-86	2.8	3.1	1.2	1.8	0.5	0.8	2.2	0.8
1990-91	2.8	3.5	1.4	2.1	0.9	1.3	2.4	0.7
1995-96	2.2	3.7	1.8	2.5	0.7	1.3	2	1
2000-01	2.6	4.1	2.2	2.7	1.1	1.4	2.5	0.6
2005-06	3.1	3.8	2.1	2.8	1.1	1.1	2.6	0.6
2006-07	3.2	4.2	2.2	3.1	1.6	1.3	3.4	0.8
2007-08	3.4	4.2	2.7	3	1.8	1.2	3.9	0.6
2008-09	2.7	4.6	2.1	3.5	1.8	1.7	4.1	1
2009-10	3	4.2	2.1	3.3	1.6	1.6	3.8	0.7
2010-11	2.8	4.6	2	3.5	1.8	1.9	3.5	0.9
2011-12	3	5.2	2.7	3.6	2	0.7	4.4	0.9
2012-13	3.3	4.5	2.6	3.5	1.9	1.7	4	3.8
2013-14	3.2	4.7	2.8	3.9	2.1	1.6	3.6	0.9
2014-15	3.1	4.1	2	3	1.7	1.5	3	0.7
2015-16	3.1	4.4	3	3.4	1.8	1.6	1.6	0.5
2016-17	3.2	4.8	4.2	3.7	2.1	1.9	3.6	2.4
2017-18	3.4	4.8	3	3.4	1.6	2	2.4	2.3

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

.

Figure 4.5 Averages yield per hectares of different types of crops



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

4.8 Crop wise Variation in Total Cropped Area and Production in Haryana

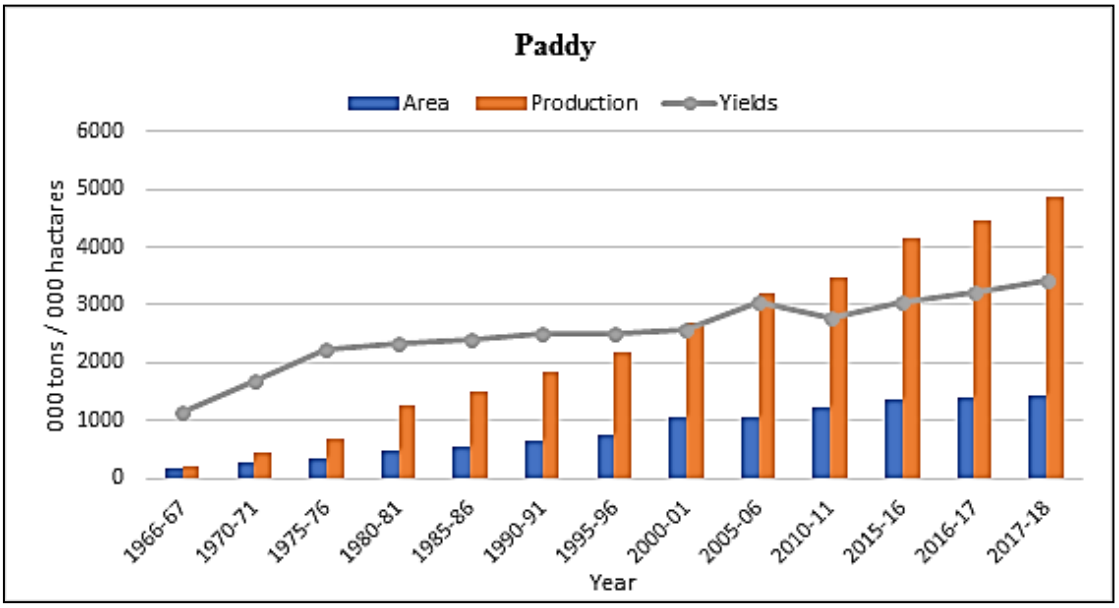
Table 4.8: Total Area, Production and Yields of Paddy in Haryana

Paddy			
Year	Area (000 hectare)	Production (000 tones)	Yields (000 tones)
1966-67	192	223	1,161
1970-71	269	460	1,697
1975-76	346	697	2,233
1980-81	484	1,259	2,326
1985-86	561	1496	2,406
1990-91	661	1,834	2,496
1995-96	755	2,167	2,521
2000-01	1054	2,695	2,557
2005-06	1047	3,194	3,051
2010-11	1243	3,465	2,788
2015-16	1353	4,144	3,061
2016-17	1385	4,453	3,213
2017-18	1422	4,880	3,422

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

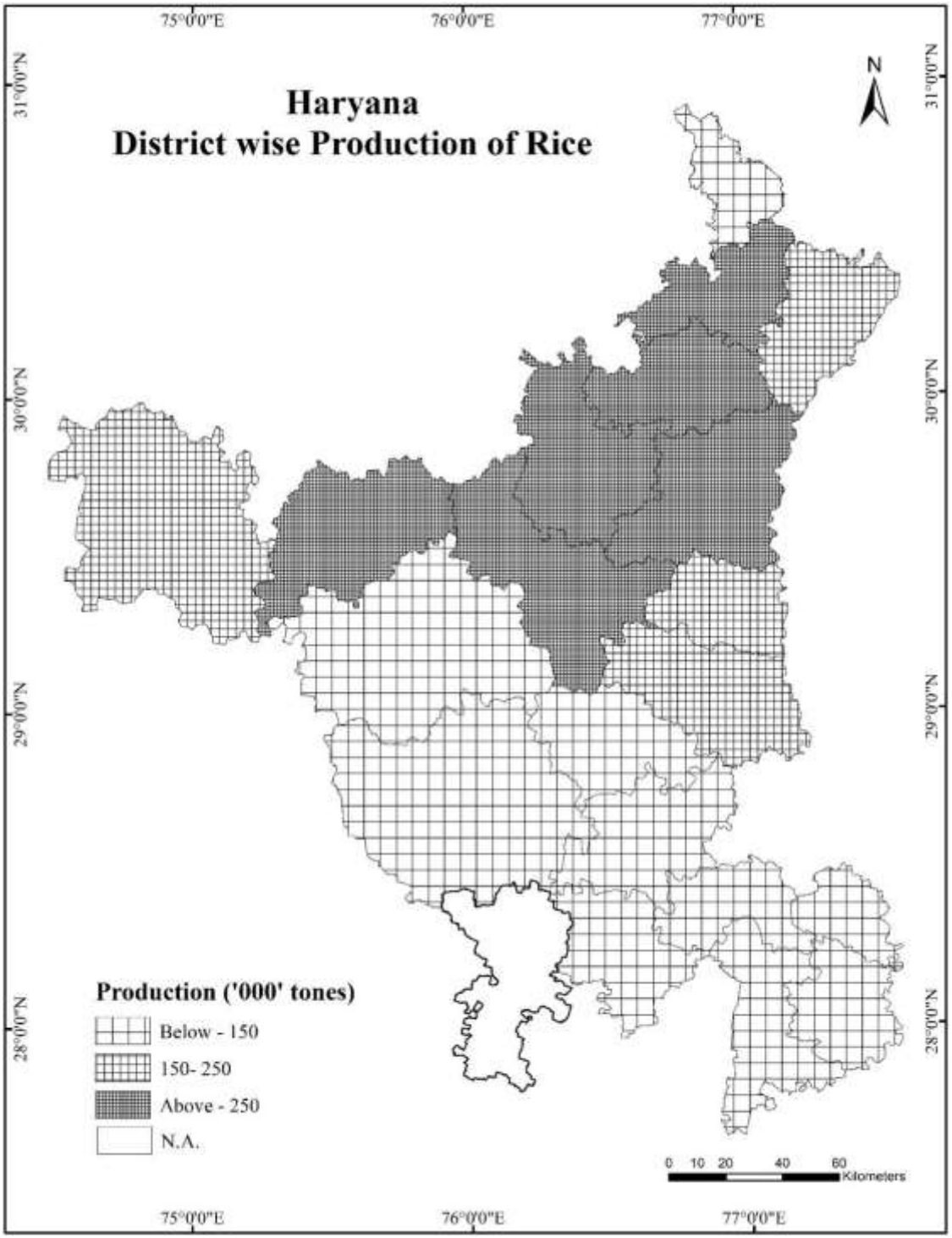
Table 4.8 depicts the total area, production and yield of Paddy in Haryana from 1966-67 to 2017-18. The total area of the Paddy was increased by 641 per cent from 1966-67 to 2017-18. The total production of the Paddy in Haryana was increased by 2088 per cent from 1966-67 to 2017-18. With reference to total area and total production the total yield of the Paddy in Haryana was increased by 195 per cent, the main reason behind this was the use of high yield seeds in the fields by the marginal and small farmers.

Figure 4.6: Trend change of total Area, Production and Yields of Paddy in Haryana



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18

Map 4.2: District wise Rice Production



Source: Statistical Abstract of Haryana from 2017-18.

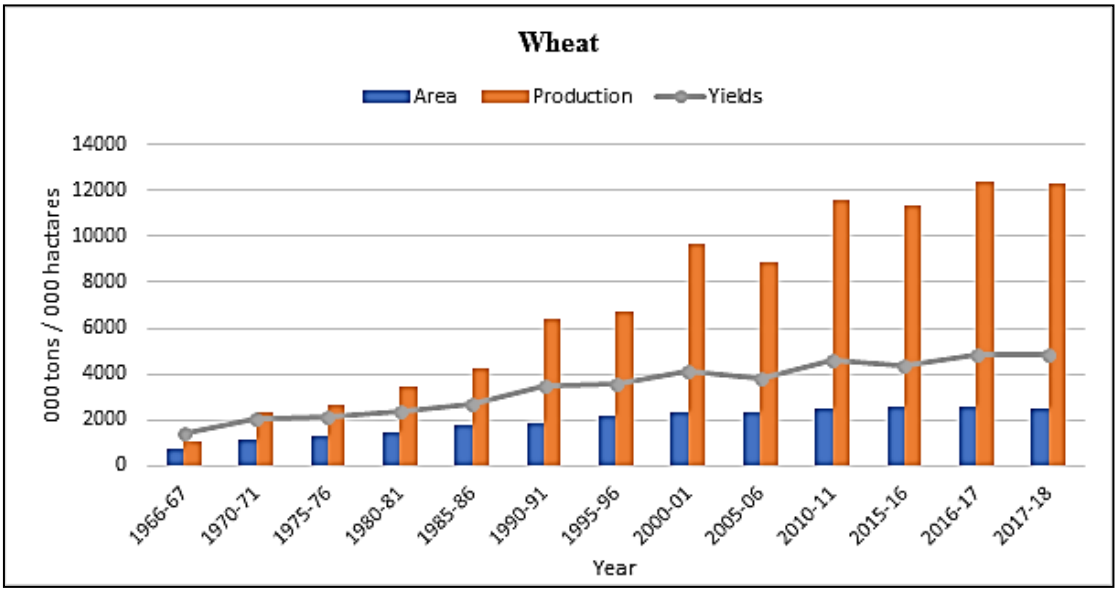
Table 4.9: Total Area, Production and Yields of Wheat in Haryana

Wheat			
Year	Area (000 hectare)	Production (000 tones)	Yields (000 tones)
1966-67	743	1,059	1,425
1970-71	1,129	2,342	2,074
1975-76	1,316	2,625	2,123
1980-81	1,479	3,490	2,360
1985-86	1,765	4,273	2,709
1990-91	1,850	6,436	3,479
1995-96	2,141	6,725	3,603
2000-01	2,355	9,669	4,106
2005-06	2,303	8,853	3,844
2010-11	2,504	11,578	4,624
2015-16	2,576	11,351	4,407
2016-17	2,564	12,384	4,828
2017-18	2,531	12,263	4,847

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

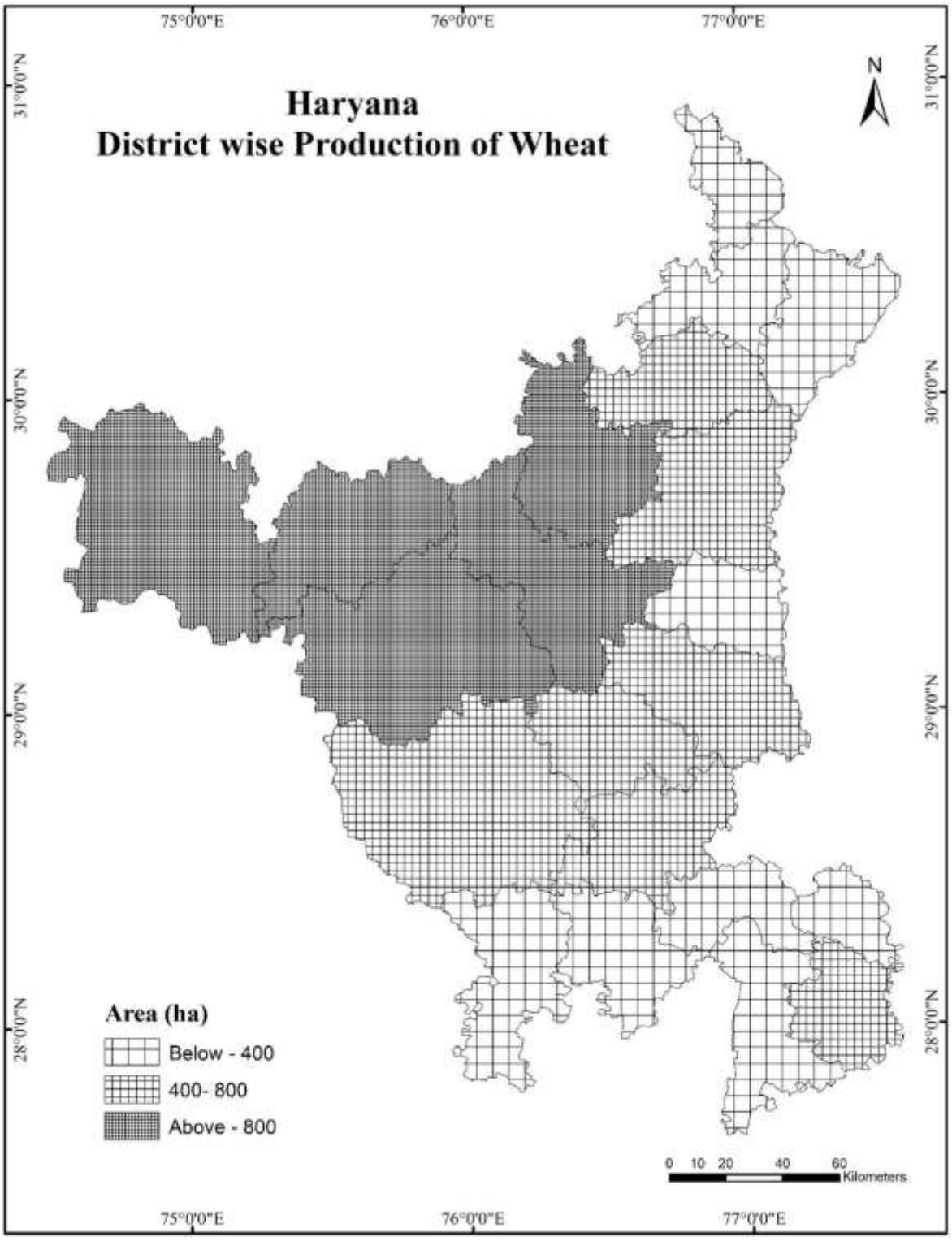
Table 4.9 depicts the total area, production and yield of wheat in Haryana from 1966-67 to 2017-18. The total area of the wheat was increased by 241 per cent from 1966-67 to 2017-18. The total production of the wheat in Haryana was increased by 1058 per cent from 1966-67 to 2017-18. With reference to total area and total production the total yield of the wheat in Haryana was increased by 240 per cent, the main reason behind this was the use of high yield seeds in the fields by the marginal and small farmers.

Figure 4.7: Trend change of total Area, Production and Yields of Wheat in Haryana



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Map 4.3: District wise Wheat Production



Source: Statistical Abstract of Haryana from 2017-18.

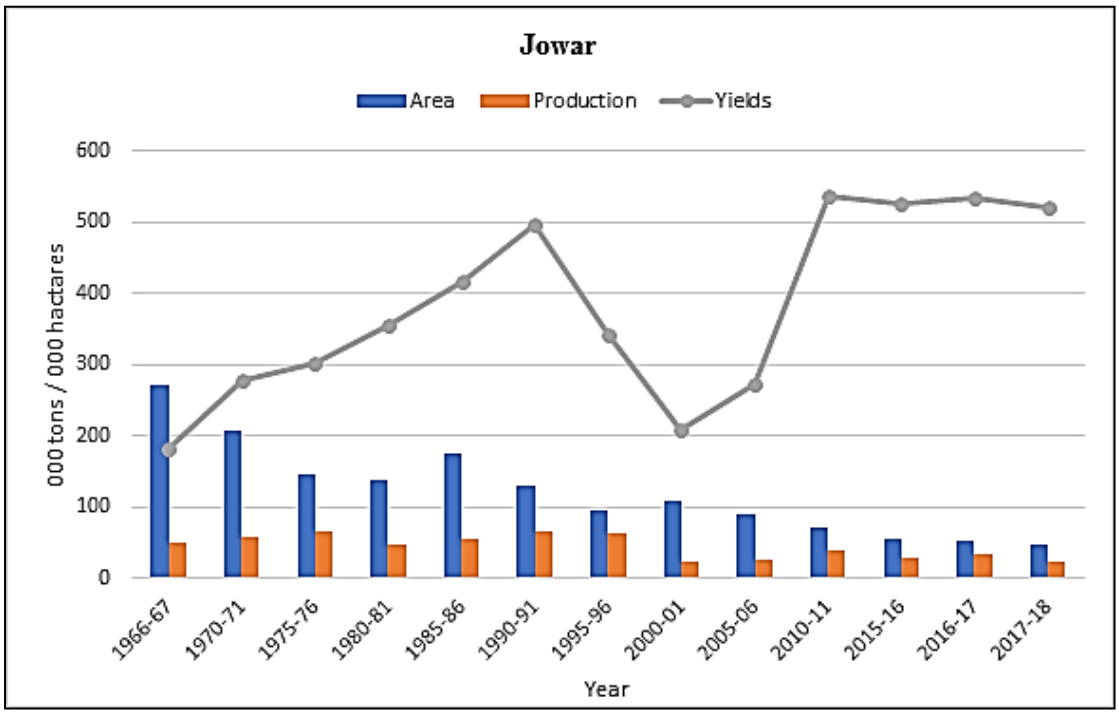
Table 4.10: Total Area, Production and Yields of Jowar in Haryana

Jowar			
Year	**Area (000 hectare)**	**Production (000 tones)**	**Yields (000 tones)**
1966-67	270	49	181
1970-71	207.3	57	277
1975-76	144.6	65	303
1980-81	136.9	48	354
1985-86	174.2	56	415
1990-91	129.4	65	497
1995-96	96.1	63	342
2000-01	109.4	23	208
2005-06	89.2	26	272
2010-11	70.8	38	535
2015-16	55.1	29	525
2016-17	52.4	33	533
2017-18	47.5	24	519

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Table 4.10 depicts the total area, production and yield of Jowar in Haryana from 1966-67 to 2017-18. The total area of the Jowar was decreased by 82.4 per cent from 1966-67 to 2017-18. The total production of the Jowar in Haryana was decreased by 51 per cent from 1966-67 to 2017-18. With reference to total area and total production the total yield of the Jowar in Haryana was increased by 186 per cent, the main reason behind this was the use of high yield seeds in the fields by the marginal and small farmers.

Figure 4.8: Trend change of total Area, Production and Yields of Jowar in Haryana



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Table 4.11: Total Area, Production and Yields of Maize in Haryana

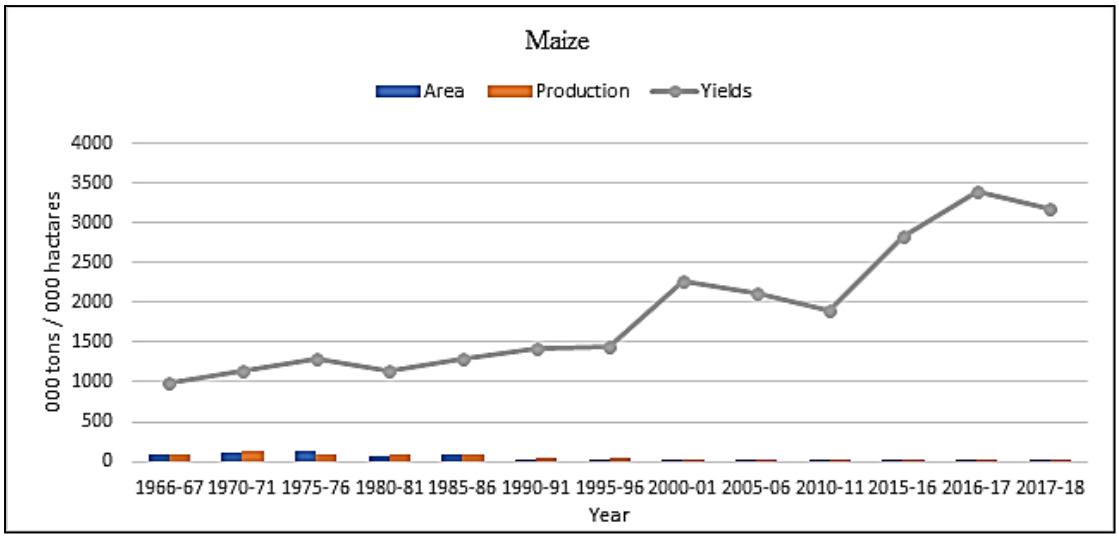
Maize			
Year	Area (000 hectare)	Production (000 tones)	Yields (000 tones)
1966-67	87	86	988
1970-71	114.4	130	1,142
1975-76	141.8	94	1,296
1980-81	71.3	81	1,134
1985-86	98.7	85	1,288
1990-91	34.8	49	1,414
1995-96	23.8	54	1,451
2000-01	15.4	34	2,267
2005-06	17.5	36	2,118
2010-11	9.6	19	1,900
2015-16	6.1	18	2,833
2016-17	6.2	26	3,400
2017-18	6.4	19	3,168

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

Table 4.11 shows the total area, production and yield of Maze in Haryana from 1966-67 to 2017-18. From the table it was clear that area (000 hectare) and production (000 tones) was decreased from 87 to 6.4 and 86 to 19 respectively but the yield was increased from 988 (000 tones) to 3168 (000 tones) from 1966-67 to 2017-18. The main reason behind high yield production was

the use of chemical fertilizers and high yield seeds by the small and marginal farmers as discussed with the local farmers during the field survey. It is used in food feed and ethanol production mainly and its demand was increased because of high demand from the poultry industries.

Figure 4.9: Trend change of total Area, Production and Yields of Maize in Haryana



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

The table from 4.7 to 4.10 shows correlation between the cropping pattern of various crops in the state Between 1966-67 to 2017-18, paddy, wheat, oilseeds and cotton have recorded a positive growth and maize, jowar, bajra and pulses has been reduced. Therefore, total cropped area and overall production of various crops in Haryana reflect consistent expansion and dominance of paddy and wheat in the state. On the other hand, barley, bajra, oilseeds, maize, cotton and pulses have witnessed drastic downfall in the overall production and total area cropped throughout the last forty-nine years. Any crop failure (low yield or flat market prices) disturbs the input-output ratio thus pressurizing the farmers to opt for climate resistantcrops. Haryana's the acreage under gram and rapeseed/mustard seed is positively and significantly associated with price but insignificantly related with yield and perhaps this explains the paradox of increasing prices but declining proportionate areas under pulses and oilseeds in the cropping pattern.

4.9 Horticultural in Haryana State

Table 4.12: Horticultural in Haryana

Years	Area (Hectares)	Production (Tones)	Percent
1966-67	19170	162887	11.77
1970-71	35054	289073	12.13
1975-76	54418	434992	12.51
1980-81	63220	680050	9.30
1985-86	70809	657437	10.77
1990-91	68050	902907	7.54
1995-96	115760	1568015	7.38
2000-01	181115	2491035	7.27
2005-06	277479	3298089	8.41
2006-07	328601	3712724	8.85
2007-08	326296	3622575	9.01
2008-09	355515	4264844	8.34
2009-10	364375	4457585	8.17
2010-11	415930	5149290	8.08
2011-12	429968	5711597	7.53
2012-13	436549	5696662	7.66
2013-14	450605	6295025	7.16
2014-15	439605	6144328	7.15
2015-16	490700	7050568	6.96
2016-17	490144	7097846	6.91
2017-18	528598	7657849	6.90

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

The table 4.12 shows the area (hectares) and the total production (tones) for Horticulture in Haryana. The ratio of area and production for the year 1966-67 was 11.77 per cent and it kept on increasing till 1975-76 (12.51 per cent) after that it was decreased to 9.30 per cent and after that it was slightly increased to 10.77 in the year 1985-86. From 1990-91 to 2000-01 the ratio of area and production of Horticulture in Haryana was decreased from 7.54 per cent to 7.27 per cent. From 2000-01 to 2007-08 the ratio of area and production of Horticulture in Haryana was increased from 7.27 per cent to 9.01 per cent after that it was decreased to 7.53 till 2011-12 but it was slight increase to 7.66 in the year 2012-13 after that keep on decreasing till 2015-16. From 1966-67 to 2017-18 it was decreased from 11 per cent to 6.90 per cent with 4.87 per cent point difference. One of reasons for higher growth under horticulture especially under fruits may be less water requirement than wheat and paddy. The high variability in its production indicates that it may have been adopted in water scarce regions.

4.10 Total Irrigation Area versus Productivity of Agricultural Land in Haryana State

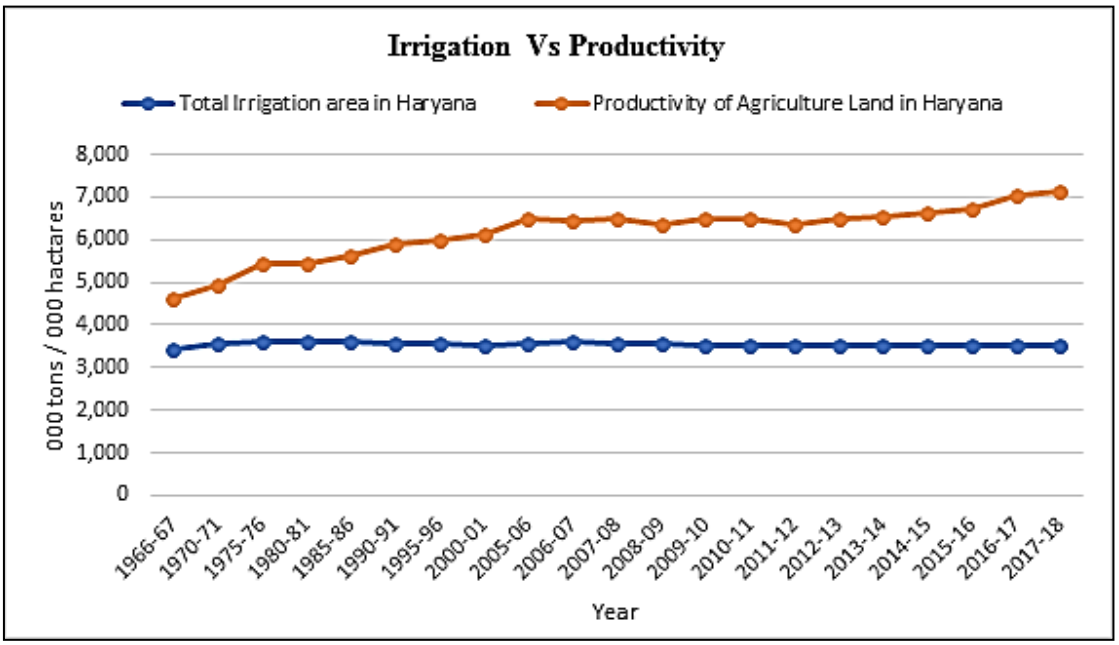
Table 4.13: Total irrigation area vs productivity in Haryana States

Years	Total Irrigation area in Haryana	Productivity of Agriculture Land in Haryana	Percentage
1966-67	3,423	4,599	74.43
1970-71	3,565	4,957	71.92
1975-76	3,624	5,451	66.48
1980-81	3,602	5,462	65.95
1985-86	3,613	5,601	64.51
1990-91	3,575	5,919	60.40
1995-96	3,586	5,974	60.03
2000-01	3,526	6,115	57.66
2005-06	3,566	6,509	54.79
2006-07	3,594	6,458	55.65
2007-08	3,576	6,500	55.02
2008-09	3,550	6,351	55.90
2009-10	3,518	6,505	54.08
2010-11	3,512	6,489	54.12
2011-12	3,513	6,376	55.10
2012-13	3,497	6,471	54.04
2013-14	3,522	6,536	53.89
2014-15	3,520	6,621	53.16
2015-16	3,524	6,701	52.59
2016-17	3,528	7,033	50.16
2017-18	3,535	7,128	49.59

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

The table no. 4.13 shows a correlation between the total irrigation area with productivity of agricultural land in the state. As irrigation sources increased such well, tube- well, canal, the area got irrigated so the productivity of land increased. The ratio of total irrigated area with the total productivity in Haryana for the year 1966-67 was 74.43 per cent which was further decreases to 49.59 per cent for the year 2017-18. The total percentage decrease from 1966-67 to 2017-18 was 24.83 per cent. So, we can say that form the above table that the irrigated land area in Haryana was somehow remain same after 1966-67 but the productivity was increased by 55 percent. The productivity was increased after the Green Revolution, in which high quality seed and fertilizers were used in the agriculture fields.

Figure 4.11 Total irrigation area vs productivity in Haryana States



Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

4.11 Various Index Numbers Relating to Agriculture in Haryana

The agricultural index is necessary to study trends over time in areas, yields, yields, productivity, prices, etc., and to study the performance comparison of the agricultural sector with other sectors. Since the absolute numbers of known areas, yields, etc. are suitable for investigating trends over time, the index was constructed after properly considering changes in coverage and estimation methods. The index prepared by the Ministry of Agriculture can be divided into two main categories: (a) index of area, yield and production, and (b) index of terms of trade between the agricultural and non-agricultural sectors.

Table 4.14: Various Index Numbers relating to Agriculture in Haryana

Year	Index of Area under crops	Index of net area sown	Index of cropping intensity	Index of cropping pattern	Index of yield	Index of productivity per hectare of net area sown	Index of Agricultural production
1969-70	92.79	98.37	93.35	96.68	101.92	92.95	91.43
1975-76	101.98	100.49	100.83	97.4	100.49	99.33	99.82
1980-81	100.51	99.88	101.66	101.31	104.46	106.5	106.37
1985-86*	103.36	100.19	103.93	103.13	132.75	141.23	141.5
1990-91*	110.07	99.13	111	107.76	152.7	182.71	181.12
1995-96*	114.45	99.44	111.68	116.57	146.17	196.11	195.01
2000-01*	116.32	97.78	127.4	118.54	161.53	227.79	222.73

2005-06*	122.07	98.93	134.08	100	187.94	231.9	229.42
2006-07*	119.61	98.65	132.35	100	216.91	263	259.45
2007-08**	100.1	100.62	179.74	100	104.78	104.23	104.88
2008-09**	100.7	100.14	181.77	100	107.42	108.03	108.18
2009-10**	101.46	99.41	178.9	100	104.06	106.2	105.57
2010-11**	101.45	98.51	184.91	100	107.55	110.75	109.1
2011-12**	104.83	98.37	184.71	100	116.25	123.88	121.86
2012-13**	104.81	98.37	181.5	100	108.09	115.17	113.29
2013-14**	105.51	97.92	185.04	100	109.61	118.11	115.65
2014-15 **	109.42	98.48	187.96	100	97.42	108	106.6
2015-16**	133.32	98.51	185.8	100	100.38	135.85	133.83
2016-17**	107.63	99.35	184.39	100	113.7	121.98	121.19
2017-18**	111.45	102.24	189.76	100	107.58	120.68	119.9

Source: Director, Land Records, Haryana.

*: Base year 1981-82 =100.

**: Base year 2007-08 =100.

4.12 TOTAL AREA OF CROPS AND RESPECTIVE PRODUCTION

4.12.1 Area of Land for Production for Wheat

Sirsa District is top the production for wheat which production is 5085765 tons and Panchkula is the least in the production of wheat which production is 219717 tons.

4.12.2 Area of Land for Production for Rice

Karnal and Kaithal District are top the production for rice which production is 3162501 and 3020935 tons and Mahendragarh is the least in the production of rice which production is 120 tons.

4.12.3 Area of Land for Production for Bajra

Hisar and Rewari District are top the production for bajra which production is 543801 and 498564 tons and Ambala is the least in the production of bajra which production is 60 tons.

4.12.4 Area of Land for Production for Barley

Bhiwani and Rewari District are top the production for barley which production is 141307 and 126204 tons and Ambala is the least in the production of wheat which production is 105 tons.

4.12.5 Area of Land for Production for Jowar

Rohtak and Jhajjar District are top the production for barley which production is 337581 and 308729 tons and Ambala, Sirsa, Panchkula are the least in the production of wheat which production is 0 tons.

4.12.6 Area of Land for Production for Maize

Sonipat and Kurukshetra District are top the production for barley which production is 7833 and 6962 tons and Rewari is the least in the production of wheat which production is 3 tons.

4.12.7 Area of Land for Production for Pulse

Bhiwani District is top the production for barley which production is 232285 tons and Panchkula is the least in the production of wheat which production is 535 tons.

4.12.8 Irrigation Area of Land for Wheat

Sirsa and Fatehabad district are top for irrigation of wheat for production which area are 50857650- and 5431411-hectare square and Panchkula district is the least in irrigation of wheat for production which area is 219717-hectare squares.

4.12.9 Irrigation Area of Land for Rice

Karnal and Kaithal district are top for irrigation of rice for production which area are 3162501- and 3020935-hectare square and Mahendragarh district is the least in irrigation of rice for production which area is 120 hectare squares

4.12.10 Irrigation Area of Land for Bajra.

Hisar and Rewari district are top for irrigation of Bajra for production which area are 543801- and 498554-hectare square and Ambala district is the least in irrigation bajra for production which area is 60-hectare squares.

4.12.11 Irrigation Area of Land for Barley

Bhiwani and Sirsa district are top for irrigation of Barley for production which area are 141307-

and 126204-hectare square and Panchkula district is the least in irrigation of Barley for production which area is 105-hectare squares.

4.12.12 Irrigation Area of Land for Jowar

Rohtak and Jhajjar district are top for irrigation of Jowar for production which area are 337581- and 308729-hectare square and Fatehabad district is the least in irrigation of Jowar for production which area is 0-hectare squares.

4.12.13 Irrigation Area of Land for Maize

Sonipat and Kurukshetra district are top for irrigation of wheat for production which area are 7833- and 6962-hectare square and Mewat district is the least in irrigation of wheat for production which area is 3-hectare squares.

4.13 CORRELATION

The value of correlation coefficient (R) between land transformation, Agricultural farm income and crop selection pattern was 0.460 which showed that there was strong relation between them. The value of regression coefficient (R square) was 0.368 which showed that there was 36.8 per cent of variation on land transformation by Agricultural farm income and crop selection. The value of F changes is 2.518 with p value 0.012 which was less than 0.05 level of significance which showed that the model was statistically fit. So, we accepted the alternate hypothesis i.e. There is impact of land transformation on crop pattern and productivity.

Table 4.15: Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.460[a]	0.368	0.341	2.42781	0.027	2.518	2	284	0.012
a. Predictors: (Constant), Agricultural farm income, Crop selection pattern									

Source: Statistical Abstract of Haryana from 1966-67 to 2017-18.

4.13.1 Trend in Yields of major crops (in 000 tones) in Haryana State

Haryana would be divided into three agro-climatic zone based on a few previous studies and agricultural and climatic characteristics. Agro climatic zone is a term used to describe a group of people who live in from the cone, the indicator shows how many zones Haryana is divided into and on what basis. Haryana's gross geographical area is 4.42 million hectares, and 80 per cent of it is under cultivation. Irrigated land accounts for 84 per cent of the state's agricultural land. The district cropping rate is 181 per cent, with overall food grain output reaching 13 million tones. Rice-Wheat, Cotton-Wheat, and Bajra-Wheat are the most popular cropping systems. Agriculture's natural capital base, which was once sufficient for long-term sustainability, is dwindling and degrading, affecting production ability. A total of 62 per cent of the state is covered by low quality water. Water tables are falling and increasing, soil salinity/alkalinity is decreasing, soil quality is deteriorating, and crop yield is stagnating. The most feasible alternative for rising output is by efficiency-mediated productivity enhancement (Indian Council of Agricultural Research, 2021). The state is divided into three zones based on ecology and cropping patterns.

4.14 SUMMARY

Agriculture is one of the human activities that are particularly influenced by nature and environment. Agricultural Meteorology is a multidisciplinary study that explores these two things in relation to agriculture. Agricultural meteorology, when employed appropriately, may help ensure the long-term stability of agricultural production processes by improving agro-climatic resource control and crop microclimate adjustment. Meteorological parameter determines each plant's developmental stage. Per genotype has its own collection of optimal climatic conditions for achieving its maximum potential. "As a consequence, knowing meteorological parameters and their effect on crop growth and yield is important in agriculture. More specifically, encouraging productive high-value production, non-farm practices, and community-led participatory processes must remain a constant priority. According to Technical Surveys of Haryana, the total existing geographical region is 4,421, Village Papers (Reporting area) 4,371, Forests 38, and not accessible for Cultivation total (653) in 2018-19, with Area placed to Non-agricultural uses (534), Barren and Uncultivable land (119). Other total uncultivated land in Haryana, besides fallow land, is 86, with Permanent pastures and other grazing lands (25), Land under miscellaneous trees, crops, and groves (9), Culturable waste land (17), total (51) and follow land (22) in (000 Hectare) for the year 2018-19. However, better

outcomes from rural development programmes may be ensured by holding those responsible for real executions accountable. Cultural shifts, rural people's changing mindsets, village government, and local conflict resolution systems and procedures are some of the topics that should be investigated in detail. According to Shah (2015), the regional concentration of tribal populations differs considerably, so their proportion cannot be called a systemic feature in our indicator schemes. We suggested that policies targeted at region- specific rural transition forms can be a successful way to bridge the divide between the country's urban and rural regions, based on our results discussed in chapter 7. The new launch of the 'Rurban Mission' focused on village clusters is a major move in this direction. The findings justify the conduct of additional region-specific case studies to monitor and assess the efficacy of rural transformation programmes".

CHAPTER 5

AGRICULTURAL AND RURAL DEVELOPMENT IN THE STATE OF HARYANA

5.1 INTRODUCTION

According to statistics, Haryana State seems to be undergoing operational revolution. The total agriculture share in gross domestic product and employment had declined, while agricultural production continued to grow (Deshpande, 2017). However, there are some irregularities in the agricultural development procedures in Haryana. One is the decline in the proportion of agricultural employment but the absolute number of agricultural employments continues to increase. This is the end result of the constant population growth of the districts, so agriculture is now the smallest area with the help of prices, but it is the largest employer. Second, there is little evidence that the productivity boom is driven by the specialization of agricultural manufacturing. Third, it is best for Haryana to start narrowing the agricultural income gap. This is due to the development pressure of agricultural hard work and the declining importance of agriculture in the economy.

The term Rural development generally refers to ways in which the value of life and financial security of people living in rural or densely populated areas are improved. Rural development continues to be at the core of state wide development. While more than $2/3^{rd}$ of the state's population makes a living from agriculture, $1/3^{rd}$ of Haryana's rural population remains poor. As a result, government must be productive and provide adequate conditions to improve living standards. Rural development refers to measures to develop rural areas to rejuvenate the rural income. Although, there are different areas which needs more concentrated observation and new innovations:

- Teaching
- Sanitation and community health
- Empowerment of females
- Construction of good buildings and infra (electricity, water, food, fertilizers etc.)
- Agriculture extension and research facilities
- Credit availability
- Employment opportunity
-

5.2 IMPORTANCE OF RURAL DEVELOPMENT

In India, every state's economy is directly or indirectly depended upon the rural economic growth and because of this the rural development is important for the state and for the rural people. The major area in rural development is to improve the starvation for around seventy per cent of the population which are living in rural areas and to deliver sufficient and healthy nutrition. The second concern is to ensure that footgear and clothing are available, as well as a clean environment and home, medical care, recreational opportunities, education, transportation, and communication.

In rural area the maximum population density is fluctuates between 150 to 500 persons per square kilometers depending upon the social and economic status of that region.

Agriculture is unique function that helps to develop the rural economic conditions and also supports the rural population. Agriculture is basically divided into four categories

Employment: Agriculture is the main activity in the rural area which is capable for the rural development and the agriculture employment share for the state is comparatively very high. Nearly fifty per cent of the labor force are mainly because of farmers which account the main economic activity in the rural areas. So, if there is any loss in the labor workforce which account a large proportion from agriculture leads to heavy destruction in the social and economic structure of the farmers family and also leads to political instability.

Associated Economy: Each country's agricultural sector supports a variety of auxiliary and service companies that produce revenue in the supply and delivery chain as well as the processing industry. When agriculture is the dominant source of income in a rural area, the entire local economy, including health care, education, and basic infrastructure, may be reliant on its success.

In remote and marginal places, society has set a legislative priority to prevent population decline, and agriculture is basic and important economic activities that keeps the area's economic strength. Environmental and cultural activities were offered by agriculture and promote the rural development.

5.3 AGRICULTURE AND RURAL DEVELOPMENT

Objective 3 of this study is, to investigate the agricultural and rural development on micro level through case studies of some selected villages. Variables have been recorded at different level of

research. In each of districts, 286 farmers were interviewed randomly drawing from as many villages as possible to gather information from widest possible geographical area of the district. Thus, a total sample of 286 farmers was interviewed through multi stage stratified random and snowball sampling method. The farmers were campaigned to the structured interview schedules to collect data related to area operated, cropping pattern, economics of the crops cultivated, activities allied to agriculture, living standard etc. The information related economics of crops and allied activities were asked from the sampled respondents in detail.

Table 5.1: Demographic Profile of Respondents

	Frequency	**per cent**
Age of Respondents		
Below 20 yrs.	39	13.6
21 – 35 yrs.	100	35
36 -70 yrs.	100	35
>71 yrs.	47	16.4
Marital Status of Respondents		
Married	117	40.9
Unmarried	91	31.8
Divorcee	78	27.3
Gender of Respondents		
Male	155	54.2
Female	131	45.8
Religion of Respondents		
Hindu	185	64.6
Muslim	31	10.9
Sikh	54	18.9
Christian	11	3.9
Others	5	1.7
Education Status of Respondents		
Illiterate	41	14.3
Primary	50	17.5
Middle	51	17.8
Matriculation	42	14.7
Senior Secondary	64	22.4
Graduation	38	13.3
Occupations of Respondents		
Farmer	54	18.9
Labour	56	19.6
Businessman	61	21.3
Housewife	62	21.7
Not Any	53	18.5

Monthly income of Respondents		
Below to 10000	55	19.2
10001-20000	56	19.6
20001-30000	64	22.4
30001-40000	57	19.9
Above to 40001	54	18.9
Number of children of Respondents		
1 Child	160	56
2-5 Child	70	24.5
more than 5 Child	41	14.3
Not any Child	15	5.2
Experience in given field of Farming		
1-3 Years	70	24.5
4-5 Years	74	25.9
Above to 5 Years	65	22.7
None of them	77	26.9
Total	286	100

Source: Survey conducted in November 2019.

5.3.1 Age of Respondents

we concluded that out of 286, respondent as farmers, 13.6 per cent of them were below 20 years, 35.0 per cent of them were of both 21 – 35 years and 36 – 70 years and 16.4 per cent of them were of more than 70 years who participate in interview.

5.3.2 Marital Status of Respondents

we concluded that out of 286 farmers, 40.9 per cent of them were married,31.8 per cent of them were unmarried and 27.3 per cent of them were got divorcee as marital status who participate in interview.

5.3.3 Gender of Respondents

we concluded that out of 286 farmers, 54.2 per cent of them were male, 45.8 per cent of them were female and it is good response of female participant in agriculture.

5.3.4 Religion of Respondents

On the basis of religion of respondents, 64.6 per cent of farmers were Hindu, 10.9 per cent of respondents were Muslim, 18.9 per cent of farmers were Sikh, 3.9 per cent of farmers were

Buddhism and 1.7 per cent of farmers were Jain.

5.3.5 Education Status of Respondents

On the basis of education status of respondents, 14.3 per cent of farmers had below 8^{th}, 17.5 per cent of farmers were 10^{th} pass, 17.8 per cent of farmers were 12^{th} pass, 14.7 per cent of farmers were graduated and 22.4 per cent of farmers were post graduated and 13.3 per cent of farmers had any other qualification of education.

5.3.6 Occupations of Respondents

we concluded that out of 286 respondents 'spouse, 18.9 per cent of them were as farmer, 19.6 per cent of them were as labour in farm, 21.3 per cent of them were in business, 21.7 per cent of them as students and 18.5 per cent of them had no any occupation who participate in interview.

5.3.7 Monthly Income of Respondents

The total income of household is combined income of the household head and other family members who participate in any kind of economic activities. It represents the economic condition of the household. In the present study total income of household head and other family members living in same household has been inquired to understand the economic status of the family. Although respondent never reveals their actual income even than an estimate of their monthly income is probed. On the basis of monthly income of respondents, 19.2 per cent of farmers had below to 10000 as income, 19.6 per cent of farmers had between 10001 – 20000 as income, 22.4 per cent of farmers had between 20001 – 30000 as income, 19.9 per cent of farmers had between 30001 – 40000 as income and 18.9 per cent of farmers had above to 40001 as income.

5.3.8 Number of Children of Respondents

On the basis of number of children of respondents, 56.0 per cent of farmers had one child, 24.5 per cent of farmers had between 2 – 5 children, 14.3 per cent of farmers had more than 5 children, and 5.2 per cent of farmers had no any child.

5.3.9 Experience in given Field of Farming

On the basis of experience in given field of respondents, 24.5 per cent of farmers had 1 – 3 years

ofexperience, 25.9 per cent of farmers had 4 – 5 years of experience, 22.7 per cent of farmers had above to5 years of experience, 26.9 per cent of farmers had no prior experience of farming.

Table 5.2 Methods adopted in this research

Research type	Survey
Sampling technique	Multi stage stratified random and snowball sampling method
Instrument used	Structured interview schedule
Scale used	Likert scale
Interview schedule language	English
Total questions in the interview schedule	28
Total Villages Considered for the survey	4
Total population taken for the consideration for survey	286
Total Male taken for the consideration for survey	155
Total Female taken for the consideration for survey	131
Total no of interview schedules considered after survey	286

Source: Survey conducted in November 2019.

Table 5.3: Household Characteristic

House Ownership		
	Frequency	**per cent**
Own	274	95.8
Rented	9	3.1
Rent Free	3	1.0
Number of Rooms in House		
1	14	4.9
2	114	39.9
3	102	35.7
4	56	19.6
Separate kitchen		
Yes	234	81.8
No	52	18.2
Separate bathroom		
Yes	254	88.8
No	32	11.2
	286	100
Separate Toilet		
Yes	254	88.8
No	32	11.2
Electricity Supply		
Yes	277	96.8531
No	9	3.14685

House Type		
Kutcha	8	2.8
Semi Pucca	102	35.7
Pucca	176	61.5
Total	286	100

Source: Survey conducted in November 2019.

Housing constitutes one of the most important indicators to judge the socio-economic status of a person. It is the house which gives complete information about the family, earning level and facilities available in a house.

Farmers are mostly self-ownership house with 95.8 per cent. Only 3 per cent are on rented house and 1 per cent are rent free. The number of rooms in the house also shows their economic status. The responses show that 39.9 per cent are having two rooms, 35.7 per centare having 3 rooms and 19.6 per cent are having 4 room in their house and a small per cent shows 1 room.

The house hold characteristic shows the living standard of the respondents. Out of total 286 respondents' 81.8 per cent of the houses are having the separate kitchens and 88.8 per cent are having separate bathroom and separate toilet. Nearly all houses are having electricity supply with 61.5 per cent house type are pucca and 35.7 per cent house type are semi pucca and only 2.8 per cent are kutcha house type.

Table 5.4: Assets of the Respondents

Assets		
	Frequency	**per cent**
Mobile	281	98.3
Jewelry	4	1.4
Television	243	85.0
Cooler	193	67.5
A.C	22	7.7
Two wheelers	177	61.9
Four wheelers	32	11.2
Fridge	276	96.5

Source: Survey conducted in November 2019.

Asset's also shows the economic condition of the respondents. Asset's count shows an irregular trend. Excluding jewelry, four wheelers and A.C all other assets huge in numbers. Nearly all respondents are having mobile phones and fridge with 98 per cent a 96.5 per cent respectively. More than 60 per cent of the respondents are having cooler and Two wheelers. 85 per cent of the respondents are having Television.

Table 5.5: Agricultural Characteristic

Ownership of Farm land		
	Frequency	**per cent**
Self	198	69.2
Wife	24	8.4
Son/ Daughter	8	2.8
Brother	2	0.7
Father	48	16.8
Mother	6	2.1
Who is the tiller of the land?		
Self	74	25.9
Helper	109	38.1
Family Member	61	21.3
In combination	42	14.7
Total	286	100

Source: Survey conducted in November 2019.

The agricultural characteristic shows that 70 per cent of the farm land are owned by the respondents and 17 per cent of the farm land owned by their father. Very less percentage of the farm land are owned by other family members. If we talked about the tiller of the farm land then, 38 per cent of the farm land tilled by the migrated helper and 26 per cent is tilled by the respondents and rest are tilled by family member or in combination

Table 5.6 Farmer's holdings are categorized in five size classes

Sl. No.	**Category**	**Size-Class**
1.	Marginal	Below 1.00 hectare
2.	Small	1.00-2.00 hectare
3.	Semi- Medium	2.00-4.00 hectare
4.	Medium	4.00-10.00 hectare
5.	Large	10.00 hectare and above

Source: Ministry of Agriculture & Farmers Welfare

Table 5.7: Use of High Yield Variety of Seeds

	Before use of high yielding variety (HYV) Seeds		After use of high yielding variety (HYV) Seeds	
	Frequency	per cent	Frequency	per cent
Marginal	43	15	42	14.7
Small	66	23.1	70	24.5
Semi-medium	73	25.5	77	26.9
Medium	91	31.8	83	29
large	13	4.5	14	4.9
Total	286	100	286	100

Source: Survey conducted in November 2019.

The use of High Yield variety is dominant during the green revolution and currently also. The use High Yield Variety helped the farmers to increase their crop yield and their farm land holding. The marginal and medium farmers are decreased by 1 per cent and 3 per cent respectively but small, semi-medium and large farmers increased after using High Yielding variety of seeds.

5.4 SUMMARY

The improvement in the economic and social structure of rural poor is termed as Rural Development. Through this process, the people themselves and the government bodies work collectively to advance the economic, social and cultural situations of the community in the lives of citizens and allow them to pay for the national plan in full. Rural development is the process of transition from traditional lifestyles to progressive lifestyles among rural communities. "It is also considered a sport of continuous progress. Researchers have imagined Rural Development as set of goals and programs to well-knit strategy, approach or even an ideology. The rising concern in rural development is due to the realization that a systematic effort is necessary to create better living conditions in the rural area in which majority of population of developing countries reside.

The survey conducted for knowing the impact of agriculture in their lifestyle. Its shows that agriculture is the primary source of income for about 68 per cent of the total survey persons. The survey shows that there is a direct relation of agriculture and rural development. The higher education level shows higher the growth of the agriculture output. The level of education gives

the strength to increase the crop production by using High Yield Variety seeds which is directly responsible for the economic growth of the farmers. The responses show that the farmers who use High Yield Variety seeds have a greater number of assets in their household.19 per cent of the farmers having Air Conditioners, Four-wheelers and Jewelry and all these farmers use High Yield Variety Seeds.

Rural Haryana has experienced a sweeping transition over the decade of fast economic development, according to the rural transformation index (Khan & Zhang, 2012). Haryana's transition has been followed by a rise in the pace of rural growth. According to the findings, Haryana's urban–rural cooperation has slipped somewhat between 2015 and 2020. In addition, there are major geographical variations in rural transformation. According to the results, policies targeted at region-specific rural transition styles may be a successful way to shape a more integrated urban–rural growth trendin Haryana.

Through wide spread urbanization, India is still a nation of villages, with a whopping 69 per cent of the population—833.5 million people—living in rural areas. According to the 2011 Census, rural India accounts for around 12 per cent of the global population, rendering it greaterthan Europe. Rural citizens are mostly working in agriculture and associated informal sector operations. However, they receive (and contribute to) a relatively small share of GDP and have low values in numerous growth indicators. In Haryana states, for example, the human development index and life expectancy also decline as the rural population increases. Similarly, child mortality, unhealthy deliveries, the number of people living in need, and the hunger index are all proportionally linked to rurality.

Between 2015 and 2018, study empirically calculates the trend and scale of rural development at the state level and for Haryana as a whole. India's economy expanded at a remarkable 8.96 per cent compound annual growth rate during the time span under consideration. Because of the large socio-economic disparities between the urban elite and the rural poor in India (Ohlan, 2013), improving the well-being of rural people is a common and political issue. Several studies have examined the motors of rural growth in Haryana, India, due to their critical significance (e.g., Fan, Hazell, & Thorat, 2000; Haggblade, Hazell, & Reardon, 2010; Lanjouw & Murgai, 2009; Sarkar & Kundu, 2016; Singh, 2009). On the opposite, just a few reports have looked at the reasons of uneven urban–rural distribution of economic change gains (Tiwari, Shahbaz, & Islam, 2013). The rural transition, which was historically over looked by politicians, has gained

a lot of coverage in recent years. The National Institution for Transforming India, for example, was created by the Indian government to replace the Planning Commission. The promulgation of the ‘Shyama Prasad Mukherji Rurban Mission’ to grow smart villages, in particular, is a symbol of the rapid change that is occurring in India’s rural areas (Gupta, 2015). This is the first systematic analysis that we are aware of that quantifies the trend and scale of rural transition in India during the decade of faster economic development. The study’s goals were to (a) explore rural transition in India from 2001 to 2011, and (b) address how to achieve integrated urban– rural growth in the future. The research is useful in developing further complexities to help grasp the socio-economic aspects of India’s rural transition. The findings could assist in the formulation of policies to resolve problems of distributive equity in the allocation of the products of economic growth on a rural–urban basis”. Following that, we’ll go through the methodological process for the three multidimensional measuring predictor frameworks that were used in the research. This segment mostly covers data sources and processing. The introduction and discussion of analytical data obtained using indicator schemes follows. The final segment summarizes the key results and discusses policy ramifications in order to forma more organized urban–rural growth trend and enhance rural life in Haryana.

CHAPTER 6

MAJOR AGRICULTURAL POLICIES AND THEIR IMPLEMENTATION IN HARYANA

6.1 INTRODUCTION

For the marketing of agricultural good, increasing the agricultural productivity and developing the agricultural infrastructure the state government constituted the Haryana state marketing board on 1 august. 1969 and this board also draft the policies for the state's agriculture. Objective four of this thesis is 'To explore the Government policies, programs for development of agricultural and rural development and assess its impact in terms of execution'. This chapter includes studying of different agricultural and rural development policies implemented by the government like "Fasal Bima Yojana and MANREGA. Prime Minister Narendra Modi unveiled Pradhan Mantri Fasal Bima Yojana (PMFBY) on February 18, 2016. PMFBY seeks to provide a robust insurance policy against crop loss, thus assisting farmers in stabilizing their profits.

Since the beginning of the liberalization reforms in the early 1990s, the country has made amazing economic and social progress. With a population of more than 1.3 billion, India is the 7^{th} largest country in the world (3 million square kilometers) and the 2^{nd} maximum populated country just after China, which accounting for 18 percent of the world's population. Agricultural property, on the other side, is incredibly scarce, with just 0.15 ha per capita. Despite the reality that urbanization has grown approximate 28 per cent to 30 per cent in the last decade (World Bank WDI, 2018). With an annual growth rate of about 7 per cent over the last five years, India accounts one of the fastest growing developing markets. Since 2014, India's economy has been strengthened by structural reforms and low commodity prices, which have increased the country's external current account status (imports and exports). Moreover, sustained fiscal shrinkage, which has reduced government deficits and debt accumulation, as well as an anti-inflationary monetary policy posture, has aided macroeconomic stability (OECD, 2017a). Significant measures have also been taken to reduce India's domestic industry less uneven. The Goods and Services Tax (GST) reform,which had been in the works for more than a decade, went into practice in July 2017. The GST substituted numerous taxes on products and services formerly imposed by the central government and states with a single value-added tax, which has the ability to increase manufacturing performance and transportation of goods and services between Indian states. Despite this, problems exist due to the various tax thresholds levied

across commodity types, the omission of some goods, and other regulatory difficulties associated with registration and payment. Since the mid-1990s, strong growth has increased GDP per capita by over 5 per cent per year, resulting in a significant decrease in poverty rate, from 45 per cent in 1993 to 22 per cent in 2011, as determined by the national poverty line, as well as a decrease in the total amount of people living in poverty. Although the total share of the urban population remains poor as compared to countries with comparable levels of growth, demographic transition would be a key driver of the Indian economy in the long run: by 2030, India's population is projected to be among the youngest in the world, with an average age of about 29 years. The middle class share of the total population and gross demand has been rapidly growing, thanks to strong economic development. According to current estimates, India's middle class could hit more than two-thirds of the population by the end of the decade if the country's development trend persists (Brookings Institution, 2015). However, owing to ongoing systemic bottle necks in the labour and commodities sectors, population trends have not been appropriately balanced by work growth so far.

6.2 IMPLEMENTATION AND IMPACT OF MAJOR POLICIES, PROGRAMS OF AGRICULTURAL AND RURAL DEVELOPMENT IN THE STUDY AREA WITH IMPACT OF ITS IMPLEMENTATION

6.2.1 Agriculture Role in the Indian Economy

India's diverse natural regions and climatic conditions provide for the production of a broad range of crops as well as a number of livestock activities. Although the agricultural sector's contribution to GDP has decreased over the last two decades, from 29 per cent in 1990 to 17 per cent in 2016 (Dynan & Sheiner, 2018), it continues to be a major source of jobs, employing roughly 47 per cent of the total national workforce, (Ministry of Labour and Employment, 2016; Ministry of Agriculture and Farmers' Welfare (MAFW), 2017; OGD Platform India, 2018; WB WD). The white revolution in milk production (which started in the 1970s), and the more recent diversification of production into pulses, fruits and vegetables, as well as beef and meat goods, preceded the green revolution in cereal production (which lasted from the late 1960s to the early 1980s) helps in the country's GDP. This is primarily attributed to shifting market trends brought about by increasing wages and urbanization, but government-sponsored diversification has also played a part. The livestock sector's share of the overall value of agricultural output has risen from 27 per cent in 2000 to 34 per cent in 2016. In addition, India is the world's largest producer of pulses, responsible for roughly a quarter of global output. Furthermore, India is the

world's second largest producer of fruit and vegetables after China, thanks to its diverse agro-climatic areas. India's agricultural exports have gradually risen and diversified since the early 1990s. As a consequence, India has gone from being a food importer to a big exporter of agricultural and allied products including corn, meat and meat goods, cotton, oilcakes, vegetable extracts, fish and fish products, and a number of other things (including wheat in some years) (Gulati, 2009, 2016; MOSPI, 2017; OECD, 2017, 2018; FAOSTAT, 2018).

6.2.2 The Country's Productivity Growth is lagging behind that of Other Countries in the Region, and Significant Obstacles

The systemic transition in India has been a typical and less marked than in other Asian economies such as China or Vietnam, with the rapid development of the services sector not being accompanied by solid growth in manufacturing and no visible changes in the economy's occupational structure following the relative growth of the various sub-sectors. Agriculture has been unable to shift labour to other parts of the economy, in part because many of its work force have poor levels of schooling and expertise, rendering it impossible for them to pursue jobs outside of agriculture. The complexities and rigidity of labour laws often contribute, making the commercial, formal sector hesitant to build employment.

As a result, India's farm labour productivity growth has lagged well behind that of other Asian economies such as China, Vietnam, Indonesia, and Thailand; and while land productivity has been growing over the last two decades, a mapping of yield patterns from 2011 to 2014 reveals that it has plateaued for many primary commodities. Aside from yield inflation, there are already differences in yield potential. In most primary crops, Haryana average yields are still poor as compared to other big producers and, in certain instances, also global averages. For example, current wheat and rice yields are roughly three times lower than the maximum world yields, whereas yields for the major fruits and vegetables – such as mango, banana, onion, and potato – are about two and seven times lower than the highest yields obtained globally. As a consequence, there is considerable untapped capacity for yield growth across most crops and producing states; provided that Haryana cultivated region is rapidly approaching its maximum, yield increases are crucial for any possible production rise (Fuglie and Rada, 2015; FAOSTAT, 2018). Despite these achievements, there are always obstacles to overcome. Agriculture's high share of jobs in comparison to its GDP allocation illustrates the sluggish rate of economic change and low labour productivity. This is one of the explanations for the poor incomes of farming households, which are about one-third of those of non-agricultural households (NITI

Aayog, 2017). Farm income development varies greatly between areas as well as between individual states (Government of India, 2017). Farmers' income is expected to double by 2022, according to the government (NITI Aayog, 2017).

Over the past decade, the rural-urban supply network has changed dramatically. To begin with, the amount of food moving across the production chain has increased in the last three decades: metropolitan food expenditures are currently three times greater in real terms than they were thirty years earlier. Second, during the same time span, eating habits have changed. Cereals' share of calorie consumption fell from 61 per cent in 2000 to 55.7 per cent in 2013, while animal products rose from 12.8 per cent to 17.1 per cent and fruits and vegetables rose from 24.5 per cent to 28.7 per cent over the same time span (FAOSTAT, 2018). Because of the private sector's presence, systemic reform is starting to emerge, moving beyond the mostly conventional or unorganized private players (such as mandi merchants, private mills, village dealers, and traditional retailers) to organized private firms, such as agri-business and major food processing companies or super markets. Demand for packaged food is growing as a result of changing migration, urbanization, behavioral shifts, rising market tastes, and a modernizing retail market. Now the time is for sustainable development implementations in each and every country, state and region to secure our planet for coming major difficulties.

6.2.3 Implementation of Sustainable Development Goals (SDGs) Applied in Haryana as per Global scenario and its Impact in Haryana

The Sustainable Development Goals (SDGs), also known as the General Goals, are a set of 17 inter-connected global goals aimed at creating a 'blue print for a prosperous and more sustainable world for everyone.'

About the fact that the targets are broad and inter dependent, a UN Resolution adopted by the General Assembly two years later (6 July 2017) rendered the SDGs more 'actionable.' The resolution sets concrete priorities for each objective, as well as metrics for tracking progress against those goals. The year during which the target is supposed to be met is normally anywhere between 2020 and 2030".

At the United Nations Summit in September 2015, India agreed to these SDGs, which went into effect on January 1, 2016. The NITI Aayog, which is based in India, has been tasked with overseeing the SDGs' introduction. Haryana has set goals for achieving the SDGs within the state, in light of India's contribution to the 2030 Agenda. The state intends to coordinate its current schemes and programmes with the SDG priorities, as well as develop a Vision 2030

document and an action plan to achieve these objectives. Haryana sees itself emerging as a growth pioneer in the coming years, not just in the region but also in South Asia, making its mark on the global stage.

Haryana's government has been steadily implementing over 450 social security programmes across 53 ministries, with a focus on extra-vulnerable communities. The phase of introducing the SDGs in Haryana began with a landscape review of the various government schemes in the state, which enabled the Haryana government to assess its current development status. The aim of this landscape review was to map current government schemes against the SDG priorities and objectives in order to search for unity, identify differences, and identify cross-sectoral linkages for better coordinated planning. This mapping offered an overall impression of how the Government of Haryana's existing schemes apply to the SDG priorities and objectives, which was also used to help create a road map for SDG implementation. This research was also used to propose working groups for the creation and development of a state-wide SDG system.

6.2.4 Implementation of Major Schemes on Rural Development of Haryana and Impact

Improved access to inputs such as fertilizers, crops, expanded irrigation coverage (including micro irrigation), and increased institutional credit scope by branch expansion of public sector commercial banks in rural areas, the implementation of the "Kisan Credit Card system, Pradhan Mantri Fasal Bima Yojana (PMFBY), NAREGA etc., enabling more timely access to credit – and agro-food marketing networks have often diversified in reaction to the fragmented domestic sector and tax and other regulatory inter-state obstacles, with promising examples including milk cooperatives and poultry contract farming.

a. Implementation of Pradhan Mantri Fasal Bima Yojana (PMFBY) and its Impact

Prime Minister Narendra Modi unveiled the Pradhan Mantri Fasal Bima Yojana (PMFBY) on February 18, 2016, as a yield insurance programme for growers. It was created in accordance with the One Nation–One Scheme theme by combining the best aspects of the previous two systems, the National Agricultural Insurance Scheme (NAIS) and the Modified National Agricultural Insurance Scheme (MNAIS), and excluding their inherent flaws (short comings). Its goal is to reduce the cost of premiums for farmers and to ensure that crop assurance claims are paid in full as soon as possible. PMFBY seeks to provide a robust insurance policy against crop loss, thus assisting farmers in stabilizing their profits. Both Food & Oilseeds crops, as well as Annual Commercial/Horticultural Crops for which past yield data is available and a sufficient

number of Crop Cutting Experiments (CCEs) are being performed under the General Crop Estimation Survey, are covered by the Scheme (GCES). Registered general insurance agencies are in charge of implementing this policy. The concerned state government selects the Implementing Agency (IA) through a bidding process. The system is mandatory for loanee farmers who take out a Crop Loan or open a KCC account for notified crops, but it is optional for anyone else. The Ministry of Agriculture is in charge of the programme. The scheme has been affected by a host of issues for farmers, including thousands of crores in unpaid dues and insurance providers pocketing the revenue (NICL, 2020).

Since Kharif 2016, Haryana has been introducing the Pradhan Mantri Fasal Bima Yojana (PMFBY). During the Kharif season, paddy, bajra, maize, and cotton are planted. Rabi seasons are when wheat, mustard, gramme, barley, and sunflower are planted. From Kharif 2020, the Central Government has made changes to the Pradhan Mantri Fasal Bima Yojana. The system is optional for farmers, as the state government has agreed to introduce it from Kharif 2020 to Rabi 2022-23, according to a notification released on July 15, 2020. Farmers would get a 1.50 per cent premium for Rabi crops, a 2 per cent premium for Kharif crops, and a 5 per cent premium for Cotton crops under the programme. Under the system, the following risks would be covered in standing crops: flood (expect paddy), hailstorm, drought, and cloud burst. Furthermore, in the event of a cyclone, cyclonic rains, or unseasonal rains resulting in damage to harvested crop lying in the field in 'cut and spread' state, yield loss may be assessed on an individual plot basis, up to a maximum time of 14 days from harvesting".

Table 6.1: Progress of the scheme from Kharif 2016 to Rabi 2019-20 (Amount in Lakh.)

Season	Total Farmers Covered	Number of Farmers Benefits	Collected Premium			Total Premium	Claim
			Farmers Share	State Share	CentralShare		
Kharif 2016	738795	150881	12735.6	8332.42	4616.37	25684.4	23423
Rabi 2016-17	597298	62606	6994.67	1892.81	1892.81	10780.3	5702.6
Kharif 2017	632421	242699	12486.7	11435.5	6181.92	30104.1	80500
Rabi 2017-18	691246	77433	8125.68	3378.77	3378.77	14883.2	8624.7
Kharif 2018	722953	322574	13908.3	26085	18099.6	58092.1	79729
Rabi 2018-19	774947	80721	10236.9	8526.07	8526.07	27289.1	12705
Kharif 2019	820585	255119	16743.2	39950.8	28970	85663.9	55559

Rabi 2019-20	890453	135212	10162.7	13156.3	13156.3	36475.2	31830
Total	6E+06	1327245	91393.7	112758	84821.8	288976	298074

Source: Ministry of Agriculture & Farmers Welfare

The State Share Subsidy for Rabi 2019-20 has been authorized, as well as the advanced subsidy for Kharif 2020-21. Additional and supplementary budgets of Rs. 307 crores were earned by the department. The Finance Department must approve the use of the funds. After obtaining government approval, the balance and advanced subsidies for Kharif 2020 and Rabi 2020-21 will be announced.

b. Implementation of NREGA scheme in Haryana and its Impact

"The Mahatma Gandhi Employment Guarantee Act of 2005 (or NREGA No 42, later called 'Mahatma Gandhi National Rural Employment Guarantee Act' or MGNREGA) is an Indian labour law and social welfare initiative aimed at ensuring the 'freedom to jobs.' This act was passed in September 2005 by Prime Minister Dr. Manmohan Singh's UPA government. It aims to improve rural livelihood protection by offering at least 100 days of wage jobs to any household whose adult members volunteer to do unskilled manual labour in a fiscal year.

Late Honorable Prime Minister Shri P.V. Narasimha Rao proposed the act for the first time in 1991. It was eventually approved by the parliament and put into effect in 625 districts throughout India. NREGA was expanded to include all of India's districts on April 1, 2008, based on the pilot experience". The government describes the law as 'the world's best and most ambitious social welfare and public works scheme.' The World Bank called it a 'stellar illustration of rural growth' in its 2014 World Development Report.

The Labour Budget for the year 2020-21 has been authorized by the Ministry of Rural Development of the Government of India, with a goal of 100 lakh person days. During the month of October 2020, the state reached a milestone of 100 lakh person days. As a result, the Haryana State Labor Budget for 2020-21 has been updated by the Ministry.

Table 6.2: Approved labour budget and achievements for the year 2020-21 (upto Nov2020)

2020-21				2019-20
Approved Labour Budget	Approved Labour Budget	Achievement upto Nov., 2020	Employment Provided upto Nov., 2020	Achievement during the year2019-20 (upto Nov., 2019)
100 lakh person days	140 lakh person days	121.65 lakh person days	5.46 lakh person days	51.00 lakhperson days

Source: Ministry of Agriculture & Farmers Welfare

On May 18, 2020, the Hon'ble Chief Minister of Haryana checked the scheme and instructed the line departments, including Irrigation, Agriculture, Forestry, PWD (B&R), Public Health to use NREGA labour in their projects, setting a goal to scale up the scheme three times its previous level. The Hon'ble CM has set the following targets for different divisions and achievement for the year 2020-21.

Table 6.3: Targets fixed by the Hon'ble CM for the various departments andachievement for the year 2020-21

Sr. No.	**Name of Line Department**	**Targets**	**Exp. as on 16.12.2020**
1	Forest Department	100	0.89
2	Public Health Engineer	20	7.89
3	PWD (B&R) Department	100	4.75
4	HSAMB department	40	3.63
5	Irrigation & WR Department	200	116.17
6	Rural Dev. And Dev. & Panchayats	800	323.63
7	Education Department/SSA	25	6.45
8	Animal Husbandry	15	0.3
9	Women & Child Dev. Department (Anganwaris + toilets)	0	1.3
10	Railways Department	0	2.13
11	Agriculture	20	0.12
12	Horticulture	0	0.06
	Total	1320	467.32

Source: Ministry of Agriculture & Farmers Welfare

(i) To study the decisions made by the DISHA Committee at the district level.

The scheme was not specifically decided on by the District Level DISHA Committee.

(ii) Human Resources Engaged by the State Government in the Program

Aside from normal State Government staff, the system often employs contracted workers:

State Headquarter	12
District Headquarter	40
Block	220

These contractual include: State HQ: IEC Coordinator, Training Coordinator, Project Officer, Technical Expert, System Analyst, Programmer, Grievance Redressal Officer, Finance Manager, DEO/Steno Typist/Clerk. District Level: - Programme Officer, Accounts Assistant and Computer Operator. Block level: - Additional Block Programme Officer (ABPO) and Account s Assistant.

(iii) Constraints and how to overcome them in software execution. Paying of unskilled staff should be rendered fortnightly after the Muster-Roll is closed, according to the MGNREGS Act. The Panchayati Raj Engineering wing is assisting with technical issues. Last year, about 79 per cent of payments were made on time, but this year, the number has risen to 99 per cent.

(iv) Flow of funds:

- Via DBT, 100 per cent of the salary is paid directly to the beneficiaries in their bank/post office account.

- The Material portion is split 75:25 between the federal and state governments.

- The Ministry provides the State with the whole administrative budget (Wage+ Material) at 6 per cent of overall expenditure (Wage+ Material).

(v) Constraints imposed by the timeline, as well as the settlement of any property disputes. There were no problems.

(vi) Asset delivery initiatives those are successful. Both DRDAs are invited to attend a

review meeting and are urged to complete existing development projects and turn them over to the public on schedule. Following the Hon'ble CM's analysis of the Scheme on 18.05.2020, the department intends to triple the size of the scheme during FY 2020-21 by including other line departments in order to align with the NREGA labour portion. Individual works to provide relief to the rural masses impacted by Covid-19 (cattle sheds, goat shelters, piggery shelters, compost pits, and vermi compost) are being prioritized this year. Horticulture planting on Panchayati fields, expansion of conventional ponds (Johar), afforestation on popular ground, and worksheets for women in Self Help Groups are the other thrust areas (SHGs).

(vii) Complaints, irregularities, misappropriation, among other issues Disputes MGNREGS has a redress process in place. A toll-free number, 18001802023, has also been established at the State Capitol for public use.

The details of CP GRAMS portal of GoI for current FY 2020 are as under:

Complaints received	Received	Disposed	Pending
CPGRAMS Portal	6	4	2

(viii) DBT and Aadhar seeding are being implemented.

In MGNREGS, 100 per cent of funds are disbursed by DBT, and 98 per cent of NAREGS employees have been seeded with Aadhar cards.

(ix) Concerns about the Central Authorities. The Government of India has been asked to add a few new practices in the allowable list so that the rural poor will profit.

- Milch cattle rearing by woman-headed households can be included in the NAREGA acceptable lists (four milch cattle at home equals one-person day).

- The job performed by a labourer for in-situ maintenance of paddy crop straw maybe added to the list of NAREGA permitted practices, thus saving the climate.

- Small and marginal farmers' operations on the field, such as pre-sowing, crop rearing,

and post-harvest, can be included on the NAREGA permissible list. Water recycling, vermi manure, and bio-agro mass management can also be included. These concerns were brought to the Ministry's attention, but no responses were obtained.

(x) Under the NAREGA programme, a social audit must be completed as soon as possible. A mechanism should be created to receive complaints and suggestions through the internet. Sincere attempts can be made to triple the scheme's size. Social audits have been performed in 1494 Gram Panchayats as part of the NAREGA programme.

- At the state level, a toll-free helpline number 18001802023 has been established to accept grievances.
- In addition, all CEOs/DRDAs/ZPs were asked to set up a toll-free helpline for complaints/questions under the system.
- A mobile application is being developed to capture online requests for Job Card registration and work demand from MNREGA beneficiaries.

Leakage or gap in Major Implementation Policies

"The National Rural Employment Guarantee Act (NREGA) and the Pradhan Mantri Fasal Bima Yojana (PMFBY) have also been criticized for leakages and corruption in their execution. Individuals are claimed to have earned compensation and job payments for work that they did not perform or just did on paper. Beneficiaries were reportedly not poor enough to qualify for the service to begin with in certain cases. In addition, Finance Minister Arun Jaitley pledged that the central government will invest INR 6000 crores on NAREGA to give it a boost. But, in 2014-15, just 28 per cent of payments to staff were delivered on schedule. The NDA government directed are-evaluation of MNREGA in 2015, after reports of irregularities in the programme, and allocated 60,000 crores to the programme in the 2019-2020 Interim Budget. The Fasal Bima Yojana and NREGA must receive adequate publicity in all villages of the notified districts/areas. Available electronic and print media, farmer's markets,workshops, SMS messages, short films, and documentaries will be used to build and disseminate knowledge of the Scheme's benefits and shortcomings among Fasal Bima Yojana and NREGA beneficiaries".

Responses of Haryana People after Implementation of Fasal Bima Yojana and NAREGA

It has been observed after analysis of national policies and programs with Content analysis,

suggestions and recommendations for sustainable rural development as per our context. This method includes studying of different agricultural and rural development policies implemented by the government like Fasal Bima Yojana and NAREGA.

Table 6.4: Response on Pradhan Mantri Fasal Bima Yojana (PMFBY)

Content for Pradhan Mantri Fasal Bima Yojana (PMFBY)	**per centageof (n=286) total response**	
Questions	Yes	No
Are known about Fasal bima yojana as implemented for Haryana state?	90 per cent	10 per cent
Is PMFBY to provide insurance coverage and financial supportdue to crop loss as a result of natural calamities, pests & diseases?	75 per cent	25 per cent
All crops are covered under PMFBY?	55 per cent	45 per cent
Is the claim received on time?	63 per cent	37 per cent
Premium rate for rabi and kharif crops are sufficient?	59 per cent	41 per cent
Whether the crop insurance scheme covers the contingentsneeds?	50 per cent	50 per cent
Insurance premium is bearable?	88 per cent	12 per cent
Fasal bima does improve economic condition of farmers?	45 per cent	55 per cent
Bank formalities are easy for farmers?	87 per cent	13 per cent
Problems in getting claims due to complicated procedure?	90 per cent	10 per cent
Farmers get compensation in time?	78 per cent	22 per cent
PMFBY is a good scheme for farmers?	70 per cent	30 per cent
PMFBY is helpful for improving the socio-economic status ofthe farmers?	75 per cent	25 per cent
PMFBY is directly helpful for increasing annual income?	68 per cent	32 per cent
Pradhan Mantri Fasal Bima Yojana (PMFBY) encourages farmers to adopt innovative and modern agricultural practices?	68 per cent	32 per cent

It has been observed after analysis of national policies and programs such as Fasal Bima Yojana and MNREGA with Content analysis, suggestions and recommendations for sustainable rural development as per our context under 17 Sustainable Development Goals (SDGs). This research was also used to propose working groups for the creation and development of a state-wide SDG system. This method includes studying of different agricultural and rural development policies implemented by the government like Fasal Bima Yojana and NAREGA. Prime Minister Narendra Modi unveiled the Pradhan Mantri Fasal Bima Yojana (PMFBY) on February 18, 2016. PMFBY seeks to provide a robust insurance policy against crop loss, thus assisting farmers in stabilizing their profits. Farmers would get a 1.50 per cent premium for Rabi crops, a 2 per cent premium for Kharif crops, and a 5 per cent premium for Cotton crops under the

programme. It has been criticised for leakages and corruption in their execution both Fasal Bima Yojana and NAREGA scheme not fully benefitted each and every people of Haryana. After personal interview with people, we have found actually the more 90 per cent people are aware about this yojana but not each and every clause so every time they thinking about risk and loss. Some of part aware like premium is to high how can easy to pay. It should be low under farmer limitation. Most of claim is not paid on case of crop is damaged naturally as per said 70 per cent respondent agreed about that. About 80 per cent respondent agreed Technology to make easy to improve awareness, Yield-data Quality & Timeliness under PMFBY but local people are not aware of this new technology. So, government should responsible to create awareness using this channel. About 70 per cent responded agreed Pradhan Mantri Fasal Bima Yojana (PMFBY) ensures flow of credit to the agriculturesector to develop the Haryana and its implementation is beneficial for every rural individual without any kind of corruption. The premium condition should be improved in existing policy.

Current Premium Rates Conditions

The Department has been instructed to resolve "Fasal Bima Yojana claims as soon as possible and to ensure that the scheme's benefits hit farmers without delay. Furthermore, the fee must be paid on schedule to the insurance provider. IA will charge the Actuarial Premium Rate (APR) under PMFBY. DAC&FW/States will monitor premium rates based on Loss Cost (LC), i.e., Claims as a per centage of Amount Insured (SI) observed in case of the notified crop(s) in the notified unit area of insurance (whatever the level of unit area) during the preceding 10 similar crop seasons (Kharif/Rabi), and loading for management expenses such as capital cost and insurer's margin.

Both empaneled insurance providers will be invited to quote their actuarial premium ratesfor the notified crop(s) in the notified insurance unit region, indemnity level, threshold yields, amount insured, and other factors as determined by the State for the season. 10.5 For more robust execution, a cluster strategy can be used to pick the Implementing Agency (IA), in which groups of between 15-20 positive and poor districts/areas with regard to threats are bid out. This would make it easier for the participating insurance firms to distribute risks uniformly to stop selecting districts/places based on the preferences of the companies. In the case of smaller states, one IA would be allocated to the whole state. This is also intended to help districts that have seen heavy actuarial premiums for crops in the past due to high danger. IA

should be chosen for at least three years".

Table 6.5: Response on National Rural Employment Guarantee Act (NAREGA)

Content for National Rural Employment GuaranteeAct (NAREGA)	**per centage of (n=286) total response**	
Questions	Yes	No
Are known about NAREGA as implemented for Haryana state?	93 per cent	7 per cent
NAREGA is helpful for improving the socio-economic status of the people?	85 per cent	15 per cent
NAREGA is helpful for increasing annual income?	80 per cent	20 per cent
Do you want any change in NAREGA policy as per day wages working hours?	90 per cent	10 per cent
Daily wages must be required change 120 days instead of100 days	100 per cent	0 per cent
Have you noticed the negligence of work by workers in NAREGA?	83 per cent	27 per cent
On contribution of reservation policy in improving socioeconomic status of rural Haryana	79 per cent	21 per cent

As per Response on National Rural Employment Guarantee Act (NAREGA), was found that 93 per cent people aware and linked with this scheme. They think NAREGA policies are more beneficial for Haryana people. It would be helpful for improving the socio-economic status ofthe farmers if do proper way of work in the required area with Plan proper for adequate awareness, publicity and benefitted as proper required in each and every scheme its means policy is effective, agreed about 96 per cent respectively. About 90 per cent respondent agreed, some changes are required in existing policy, like daily wages improved from 100 to 120, man over female differences minimize, negligence of work by workers minimized, reservation policy minimized. If current policies implemented by the government like Fasal Bima Yojana and

MNREGA for the agricultural and development are beneficial for rural Haryana as per agreed75 per cent respondent otherwise not usable for construct rural development as for our dreams.

After one year, state governments may assess the scheme's success and notify the government of India of any required changes to any of the scheme's provisions. Both villagers in the notified districts/areas must receive adequate publicity. "Available electronic and print media, farmer's markets, workshops, SMS messages, short films, and documentaries will be used to raise consciousness of the Scheme's benefits and shortcomings among cultivators and the agencies involved in its implementation. Three months prior to the start of the coverage time, the states' agriculture/cooperation departments, in coordination with IA, will devise a suitable plan for sufficient recognitionand publicity

6.2.5 Impact of New Technology to Improve Awareness, Yield-data Quality &Timeliness

It has been suggested that the new Crop Cutting Experiments (CCE) method for calculating yield is unreliable and slow, which has an effect on claims resolution. There is a need for high-quality, timely, and dependable yield results. To resolve this issue, video/image capture of crop growth at various stages and real-time transmission of CCE data through mobile communication technologies with GPS time stamping will boost data quality and timeliness, as well as help timely claim processing and payment. This technology would be used by states and insurance providers for this reason. Wherever possible, the expense of utilizing technology to perform CCEs would be split 50:50 between the Central Government and the State/UT Governments, subject to a limit on overall funds made accessible by the Central Government for this reason depending on the estimated cost of procuring hand held devices/smart phones and other associated costs and its directly impact on land use pattern.

6.2.6 Land use Patterns Persist

The ongoing fragmentation of organizational holdings, whose average size is now 1.15 ha and decreasing, distinguishes India from other countries at a similar stage of growth. A huge number of marginal and small-scale operators dominate the sector, 85 per cent of operating holdings in India are less than 2 ha, accounting for 45 per cent of total cropped area. In contrast, only 5 per cent of farmers work on farms greater than 4 ha, but they account for approximately 32 per cent of all arable property (Agricultural Census India, 2016).

In terms of law and operational structure, land tenure governance in India is highly difficult. Bad

land records, lease limits, and land ceiling rules all contribute to the concealment of ownership rights and trade impediments in rural land markets, as do restricted mobility of prospective investors, a shortage of brokerage facilities, and a limited flow of knowledge regarding purchasing and sale opportunities. A central deeds registry scheme for some form of property transfer, as well as state-level laws providing cadastral-based registers of land rights for revenue purposes, make up India's land recordkeeping system Since annual revisions are not coordinated, the documents kept by the deeds and cadastral structures may be contradictory in several ways. More importantly, the land documents kept do not constitute land deeds, but rather 'proof of ownership,' which makes it difficult for land markets to operate. In India, the maximum size of a farm (field ceilings) varies greatly between states; for example, existing ceilings for irrigated land with two crops range from 12 acres (4.9 ha) in West Bengal or Tamil Nadu to 18 acres (7.3 ha) in Haryana or Rajasthan. Due to restrictive land lease rules, occupancy has been informal, unstable, and ineffective (MAFW, 2017).

6.3 AGRICULTURAL POLICY TRENDS AND EVALUATION

The Institutional Settings Governing Agricultural and Food Policy Are Complex

Many facets of agriculture are constitutionally vested in Haryana; however, the central government plays an important role in developing national policy and providing the requisite funds for execution at the state level. Any main policy domains, such as foreign trade policies, are exclusively the responsibility of the central government. The fiscal sovereigntyof states has recently been improved as a consequence of the 14th Finance Commission's recommendations being adopted (FFC). While this model has benefits in that it requires legislation to represent requirements and circumstances at a more disaggregated state level, it also has weaknesses in that critical policies developed at the federal level which be adopted only partly or not at all at the state level. If India is to create a 'single market' for agriculture and food goods, coordinated approaches to market institutions and regulations are critical. In reality, the role of the center in financing large agricultural initiatives aids teamwork.

Since there are too many organizations involved in designing and enforcing agricultural and food policy at the national level, there's a chance of fragmentation, duplication, and ambiguous attribution of obligations. Although the Ministry of Agriculture and Farmers' Welfare is in charge of agricultural policy at the national level, several other ministries and agencies perform important roles. The Ministry of Chemicals and Fertilizers, the Ministry of Water Supplies, River Growth and Ganga Rejuvenation, the Ministry of Consumer Affairs, Food and Public

Distribution, and the Ministry of Trade and Industry are the most important among them. In certain instances, a more or less identical system is repeated at the state level (other than trade policy). Although Inter Ministerial Committees are periodically created, the creation of a permanent body for comprehensive cooperation among the several agencies involved in agricultural and food policies should be contemplated.

Long-established Laws, as well as the Lack of Rules, Impede the Efficiency of the Agricultural Marketing Chain

The Essential Commodities Act of 1955 (ECA) governs the development, delivery, sale, and pricing of essential commodities in the United States. Foodstuffs, seeds of various types, and fertilizer are among them. The ECA therefore guarantees that vital goods are retained or expanded in quantity, as well as their fair delivery and availability at affordable rates. The aim was to limit certain actions of certain agents in the light of hoarding and black marketing at the time. The ECA allows the federal government to issue directives for vital goods, which are then carried out and executed by state governments. Except for sugar, where the central government retains some authority, the ECA powers have been transferred to state governments in relation to food products. The development, storage, transportation, shipment, disposal, procurement, usage, and consumption of a commodity are all controlled by orders provided by the center or the states. These directives may be used to maximize food grain cultivation, regulate costs, ban the withholding of a product from sale, or force a stockholder to sell a commodity to the government. Although the ECA is becoming less of a force in India's agricultural commodity markets, the ECA's long-standing existence is part ofthe basis for today's agricultural output and marketing structure.

Producers' Prices Are Often Lower than Export Costs, and even Lower than Support Levels

The central government's market policy for major agricultural crops, as established by the ECA and APMC Acts, aims to ensure remunerative prices for farmers in order to promote higher investment and development, as well as to protect consumers' interests by making supplies accessible at affordable prices. The Food Corporation of India (FCI) is the primary organization in charge of carrying out the central government's food grain policies. The FCI (a) buys food grains from farmers at fair rates, (b) distributes food grains to customers by public distribution, and (c) keeps a food grain buffer stock for food protection and market stability.

Every year, the federal government provides a Minimum Support Price (MSP) for 24 crops,as well as a premium above the MSP for others. Wheat, corn, and coarse grains are purchasedby the FCI and state-level entities working on its behalf by open-ended procurement at MSP. Other agencies purchase MSP-priced pulses, oilseeds, and cotton, as well as non-MSP-priced perishable agricultural and horticultural commodities. However, price support procurement is only successful in a few states and only for maize, rice, and cotton. Most farmers sell to other buyers at prices below the MSP, especially in eastern India, where procurement is ineffective and there are no alternate buyers.

Subsidies for Fertilizers, Power, Drainage, Credit, and Other Variable Inputs Are Exceptionally Generous

On the input hand, major policies make it possible for agricultural farmers to access low-cost farm inputs. The most significant input subsidies are offered by policies regulating fertilizer, energy, and water supply. Other inputs, such as crops, equipment, credit, and crop protection, are also issued at subsidized rates under fasal bima yojana.

The government offers a subsidy to domestic urea producers to offset the gap between their manufacturing costs and their earnings from fixed-price purchases. Urea subsidies are based on multiple subsidies estimates that adjust with time due to fluctuations in foreign urea and natural gas rates Imports account for the majority (if not all) of phosphatic and potassic fertilizer use. The government fixes subsidy prices for these fertilisers in rupees per kilogram of fertilizer (nitrogen, phosphate, potash, sulphur), which translates to subsidies per tonne of phosphatic and potassic fertiliser.

In Haryana, electricity is a big input in agricultural agriculture, mainly for powering irrigation pumps that use ground water from tube wells. State regulatory bodies have the authority to set the electricity prices charged by state electricity boards to various types of consumers, including agricultural, industry, residential, and industrial. While the prices paid to agricultural customers are very competitive in contrast to other customers' rates – and still farsmaller than the overall unit cost of power supplies to other users – the energy supply is unreliable and of poor quality. Surface water for irrigation is sold to farmers at a cheaper rate than the costs paid by the government departments in charge of the supply at the federal and state levels. Although

groundwater has been a more significant source of irrigation than surface water, government-funded surface water programmes include the construction of infrastructure such as canals and dams, as well as the operation and maintenance of these facilities. In the context of an irrigation utility fee, only a limited amount of the operation and repair costs are collected by water consumers.

Under the ECA, a variety of seed types are considered important commodities. Crop policies are concerned with integrating private and public sector incentives for plant breeding and motivating growers to use approved seeds. Subsidies for farmers' usage of such seeds and better planting material are among the central government's agricultural missions. For example, support is available to increase the quality of farmer-saved seeds, and the government also offers seed development and post-harvest seed technology training to farmers. Government spending promotes the purchasing or usage of a number of other agricultural inputs, such as diesel fuel, fertilizer, machinery, and irrigation equipment.

Short-term credit accounts for the majority of unpaid agricultural credit, and this proportion is increasing. Interest subsidies in agriculture nearly often equate to short-term credit of six to twelve months, i.e., operational credit during the crop season, as opposed to subsidies for fixed-input spending. Subsidies are mainly in the form of transfers to financing agencies, allowing them to provide credit to farmers at a reduced rate. In agriculture, debt relief has taken the form of partial or absolute debt waivers, in which the government reimburses lending agencies for the costs of administering the debt waivers. Occasionally, state governments ask for or propose schemes that offer funding to lending agencies to forgive farmers' debts.

Pradhan Mantri Fasal Bima Yojana (PMFBY) that existed before 2016 have been supplemented or substituted by a system under which the government's premium subsidy has no cap. For most products, the farmer pays a premium of 2 per cent to 1.5 per cent of the insured volume in fasal bima yojana. State governments have a variety of producer assistance, with main funds coming from the federal government via missions. Via financial assistance for improved technology such as seed, micronutrients, soil enhancement, pest control, equipment, and irrigation, as well as farmer capacity building, the National Food Security Mission aims to increase wheat, rice, and pulses output while also promoting commercial crops such as cotton, jute, and sugarcane. The National Agricultural Development Plan urges states to implement state and district-level policies to enable them to invest more on crop development, horticulture, mechanization, natural

resource management, distribution, animal husbandry, dairy development, and extension. There are missions for oilseeds and palm oil,as well as integrated horticulture production, sustainable agriculture, and livestock, to name a few. There are funds for setting up soil research labs, demonstrations are organized, and organic cultivation is promoted to foster a more sustainable usage of fertilizers and micronutrients. Furthermore, several states have their own agricultural policies, such as irrigation, power, highways, rice varieties, grain and livestock diversification, drought resistance, marketing and recruitment, land leasing, and downstream cold storage and food processing facilities.

Irrigation Facilities, Testing and Expansion, and Food Protection Assurance are amongthe General Resources Provided to the Industry

Infrastructure construction and maintenance, especially capital spending on irrigation, account for the majority of general service expenses. In addition, India has a long and illustrious tradition of organized, state-funded agricultural research and production. For decades, public research spending has grown in real terms, increasing at a pace of 6 per cent each year throughout the 1990s and 2000s, showing an exemplary degree of sustained investment for a nation at India's level of growth. Over this period, federal spending has grown faster than state funding, demonstrating the government's dedication to productivity development and food production resilience. India's largest umbrella body for agricultural research is the Indian Council of Agricultural Research (ICAR). It oversees the logistical and financial operations of over a hundred academic organizations. Furthermore, Haryana has a long history of state agricultural universities that play an important role in the study eco-system. India has paved the way for public-private collaborations and technology transfer by providing free access to public science goods (ICAR – NIAP, 2017).

Agricultural Production is Taxed at a Lower Rate, and Agricultural Goods Aren'tTaxed at All

The income tax legislation of the federal government expressly exempts 'agricultural income' from federal taxes. While most farmers' earnings aren't high enough to be subject to income tax in any case, this benefit is important for bigger, commercial farmers. Agricultural revenue does not include income from sale livestock goods, which is taxed in India due to the statutory difference between agriculture and animal husbandry. State governments, but not the federal government, raise tax through a property-based levy known as 'land revenue.' Theproduction of

main agricultural goods, such as food grains, is taxed at no cost, whereas the supply of certain other foods is taxed at a low cost. The GST, which was implemented in July 2017 and covers several different types of taxes on the marketing of agricultural produce, may render interstate transportation of agricultural commodities simpler.

Wide Apparatus for Supplying Low-cost Food to a Large Number of Individuals, Resulting in Substantial Budget Spending

The federal and state governments work jointly to supply food grains to the general population. The FCI and state governments are in charge of procuring and maintaining food grains on behalf of the federal government. The FCI transports food grains from surplus states to deficit states, and the central government allocates food grains to state governments. Both states and union territories participate in the Targeted Public Distribution System (TPDS), which is governed by the National Food Security Act (NFSA) of 2013. The NFSA also manages a variety of other social services. Food grain entitlements are distributed by state governments, which entail allocating supplies throughout the state, recognizing qualifying households, issuing ration cards, and supplying food grains mostly through Fair Price Shops. State governments have their own requirements to assess which families or households are qualifying for TPDS and NFSA payments, relying on projections by the federal government. The FCI or the state government receives the difference between the economic cost (sum of MSP, procurement incidentals, and delivery cost) and the central problem price (the price at which TPDS beneficiaries will purchase food grains) as a food subsidy. In 2014-15 and 2015-16, the food subsidy grew steadily in tandem with the rise inthe number of beneficiaries under the NFSA, as more states adopted the NFSA. The pressure on the central budget is likely to continue to rise, as central problem rates are already set in legislation and regulatory amendments to reform them can be time-consuming, asprocurement prices raise year after year.

The Ministry of Agriculture and Farmers' Welfare is the central government ministry that spends the most money on agriculture and food. The Ministries of Chemicals and Fertilizers, as well as the Ministries of Consumer Affairs, Food, and Public Distribution, each account for a significant portion of the federal governments are spending. Fertilizer subsidies, agricultural power subsidies, irrigation and flood control spending, and food subsidies accounted for about two-thirds of all expenditure on cultivation and food Seed insurance and interest subsidies on short-term credit account for the substantial rise in expected spending bythe agency in charge of

moving funds to state governments in 2016-17.

Export and Import Deals Are Complicated and Unpredictable Due to Detailed and Evolving Exchange Laws

Every five years, India's Trade Strategy is revealed, and it is checked and updated annually. Until 2020, the new strategy remains in place. The strategy demands continual modification by decisions by the respective authorities, which limits the predictability of the policy regime. It is largely influenced by domestic market considerations and is designed to achieve short- term goals, such as containing energy price volatility.

6.4 RECOMMENDATIONS

- Subsidies for fertilizer should be decreased and gradually removed.

- Eradicate the mechanism under which the subsidy rate differs with foreign rates through creating a set, nominal subsidy rate and eventually phasing it out over a defined and negotiated duration.

- Use the savings to educate farmers about how to use fertilizers and other chemical inputs efficiently and sustainably, to speed up the implementation of the soil card scheme, and to fund research and development activities to encourage responsible and sustainable fertilizer use tailored to particular requirements and crops.

- Expand the pilot initiative to supplement fertilizer subsidies with a direct profit transfer (DBT), empowering growers to make their own choices on how to better utilize the funds available to them, and continue to tweak the system based on implementation experience.

- The federal government should collaborate closely with local governments and UTs to overhaul legislation in order to promote the growth of more open and sustainable markets. First and foremost, attempts to deploy and enforce changes that have already been planned, such as the proposed model APMC Act and E-NAM, should be bolstered, including the rationalization of levies and fees, as well as the elimination of 'red tape.' district should be

urged to stop ‘cherry-picking’ new provisions, which should be implemented in a uniform and coherent manner across districts. In order to define the ‘laws of the game’ and offer redress for both customers and manufacturers when dealing with anticompetitive activities, sound competition policy arrangements must be placed in effect.

- Encourage private players to compete in markets over time, gradually removing the monopoly given to government-controlled wholesale markets. Allow private storage of agricultural products and lift limits on intra- and inter-state travel.

- Supply chain structures, such as contract farming with open contracts and improved legal enforceability, can be promoted to better address shortcomings in the existing business climate.

- Invest in, and enable private investment in, market infrastructure for agricultural product handling, grading, and storage.

- Increase farmer participation in co-ops and producer organizations so that they can successfully compete in better-functioning, more sustainable markets, particularly by focused education and extension activities.

- Improve market transparency by investing in a price observatory; in the long run, allow for the growth of futures markets and invest in educating farmers and other market players about how to use them for price discovery and reduced volatility.

- Create a predictable and reliable foreign trade system for both imports and exports in order to promote investment in the creation of a new, productive supply chain from farm to retail.

- Ensure that MSPs for the goods protected do not surpass foreign benchmark rates. Ensure clear consideration of this in the price setting mechanism to secure the export competitiveness of Indian agricultural output.

- Examine the method under which MSPs are determined in relation to production costs, in order to prevent locking in unsustainable high-cost production and raising commodity prices.

- Rather than creating or extending potentially expensive and inefficient procurement schemes, improve farmers' remuneration through market changes and more sustainable practices.
- Rather than increasing prices beyond retail levels, raise the wages of the poorest producers by targeted direct cash transfers.

- Align business governance and MSP changes in a well-communicated strategy to prevent instability as policymakers increasingly pass over authority to the private sector.

- Strengthen the legislative framework that regulates land concerns by: Progressively loosening farm size ceilings and harmonizing through provinces, with the intention of removing them entirely.

- Strengthening lease and rental laws to safeguard the rights of both landlords and tenants, resulting in a more desirable investment climate.

- Increase the pace of attempts to explain and update land names, as well as the continuing push to digitize data.

- Energy prices would therefore need to be analyzed in order to address the existing perverse advantage generated by power subsidies.

- Increase research into crop varieties (and livestock breeds) that need less water, are drought tolerant, and are suited to the climatic and agrological conditions in stressed areas

- Collaborate with all stakeholders, public and private, upstream and downstream, to establish freshwater and watershed protection plans that include infrastructure growth, emerging technology, and new organizations.

- Implement overall water management plans that limit agriculture's water usage based on accessible water resources and, where appropriate, invest in productive irrigation technology like drip irrigation and precision agriculture, including in rain-fed areas where water is abundant but irrigation has been underutilized to date.

- Consider tougher steps, such as restricting extraction or imposing water charges that represent the resource's opportunity cost before investing in water usage quality, in places where the most serious water threats exist.
- Extend the scope and usability of public-sector commercial banks in rural regions, as well as their risk-assessment and payment-capacity-assessment capacities.

- Take steps to limit the actions of illegal lenders; a stronger structured sector will aid this effort.

- Promote long-term loans by widening the variety of financial resources accessible to farmers, enabling them to invest in long-term productivity growth like Pradhan Mantri Fasal Bima Yojana (PMFBY).

- Minimize and ultimately eradicate loan relief, which allows creditors and banks to indulge in activities that stifle the creation of a sustainable commercial farm financing market.

- Invest in rural infrastructure, both general infrastructure like highways and health care and unique infrastructure like agro-food infrastructure. In this regard, digital accessibility can be especially relevant.

- Engage in rural schooling in order to boost the job opportunities of those who do not have a long-term future in agriculture.

- Ensure the job-creating growth is distributed spatially to include income-generating prospects for those whose land holdings are insufficient to provide a reasonable family income on their own such as NAREGA and MNREGA policy implementations.

- Include the funds required to improve the agricultural sector's research and development rate, while maintaining a proper balance between clear central priority setting and coordination and more bottom-up regional and local methods, as well as the quality of research staff and systematic outcome tracking.

- Strengthen the emphasis on current issues such as biodiversity, climate change, and diversification requirements by encouraging inter-disciplinary and processes approaches to

innovation using sustainable development goals (SDGs) proper implementations.

- Continue and accelerate extension framework changes, concentrating on the interests of smallholders who are unable to reach commercial resources and expanding beyond traditional policies to include climate change, innovation, and industry and digital capabilities. Pay heed to the efficiency of extension staff as well as the results' systematic tracking.

- Invest in rural data connectivity to strengthen the opportunity to provide education and extension programmes, as well as business knowledge, and to promote agricultural and rural growth.

- Ensure that intellectual property rights are inclusive of required developments and that competition policy settings are acceptable.

- Launch a large-scale public awareness drive in Haryana, outlining the need for and advantages of emerging technology.

- As economic development and related standards of living improve, steadily reduce the share of the population protected by the NFSA 2013, causing certain households to be excluded as they hit higher income levels. Simultaneously, the key problem rates at which eligible households buy food grains from reasonable price shops should be raised, as the law allows but has not been enforced since 2002.

- Experiment with direct cash transfers or DBT to supplement physical grain distributions, and extend and adapt if needed based on results. Start with cities with populations over 1 million, then go on to grain surplus states, as proposed by the HLC. Allow entitled families to keep their preferred alternative between direct delivery and a cash transfer in grain deficit states for the near future.

- Create a food protection fund for use in the event of a food security issue or occurrence. Procure at retail rates when market changes are being enforced.

- Enable the private sector to invest in stock development and management.

- Ensure that the sum of the NFSA benefit provided by DBT is adequate to adequately reward families who are already earning the maximum standard of TPDS benefit.

- Construct the framework so that it will easily raise compensation to the poorest households in the case of a sharp price increase, and propose making payments to women.
- Retain the existing food delivery structure where private markets are thin to non- existent and there is a possibility that converting to DBT would exacerbate social outcomes. Where payment leakages are likely, an alternate food coupon scheme (along the lines of the US SNAP programme, formerly known as food stamps) may be created, but only if it allows beneficiary families to select from a broader variety of food products.

- To eliminate gaps and automate processes, streamline and articulate trade policy positions and obligations in all ministries and agencies.

- Overcome a number of supply-side constraints in enforcing SPS steps, such as efficient frameworks for disseminating SPS-related knowledge among value-chain stakeholders, as well as adequate infrastructure and technologies.

- Where feasible, overhaul state trade companies to create space for private sector participants.

- Lower tariffs and loosen other import controls that are imposed from time to time in order to provide a more flexible and consistent import regime.

- Eliminate export restrictions in order to establish a secure and predictable business climate in which farmers and private traders would be willing to invest in the supply chains needed to make India a sustainable and dependable agricultural exporter.

6.5 CONCLUSION

The agro-food industry in India is at a crossroads, with numerous obstacles and opportunities. The policy directions taken now and in the coming years will determine how effective Haryana is in providing food security for its vast population, improving the quality of life of its millions of smallholders, overcoming severe resource and climate pressures, and generating sustainable

productivity growth and creating a modern, efficient, and resilient agro-food system, all while generating sustainable productivity growth and creating a modern, efficient, and resilient agro-food system.

The fate of the agro-food industry would be decided first and foremost by positive, stable macroeconomic and structural policy environments, rather than purely by sector-specific interventions. Quality infrastructure, education, and expertise, as well as well-functioning capital markets, strong business structures, the rule of law, excellence in innovation processes, and global market penetration would be required to achieve the sustainable growth that will pull labour out of the sector and provide the conditions for the sector's production. Rural areas, which, according to many indices of growth and well-being, lag behind urban areas, may need special consideration. Agriculture and food policy settings also need to be re-aligned to consider the evolving nature of the sector's position in a fast-increasing economy with a large and rising middle class, as well as Haryana's growing regional and global presence with respect of transformation of agricultural sectors. Failure to match policies and associated limited discretionary capital to the priorities of food protection, sustainable productivity development, and climate change adaptation could result in significant costs and risks covered in Pradhan Mantri Fasal Bima Yojana (PMFBY). Coordination toward a collective vision is critical in order to establish consensus goals and legislative responses to them. Agriculture and food policymaking governance arrangements are not conducive to the creation of consistent and integrated policy structures. In this regard, attempts to explain positions and reduce fragmentation and duplication should be stepped up. Stronger coordination processes between Ministries, Departments, and Organizations, as well as between States and UTs and the federal government, will be beneficial. Because of the scale of the agricultural community, the vibrancy of India's democracy, the pervasiveness of government interference to date, and a number of other fiscal, social, and cultural considerations, the political economy of attempts to transfer the direction of agricultural and food policies would demand special attention. This will necessitate, among other things, improving the institutional system to avoid overlap and fragmentation, substantial investmentin forging agreement on common priorities and how to accomplish them, including between the center and the states, incremental and progressive dismantling of outdated or inadequate policy instruments and careful introduction of new ones, and the creation of new policy instruments with careful sequencing.

Finally, climate change is expected to have a major effect on Haryana (India). Climate change will be felt by the mid-century as a rise in global surface temperature, shifts in rainfall during monsoon and non-monsoon months, and an increase in the frequency and severity of droughts,

flooding, and other severe weather events was not covered by any policies such as Pradhan Mantri Fasal Bima Yojana (PMFBY). As a consequence, production uncertainty would possibly increase, and yield increases for key crops would likely be weaker than wouldbe predicted in the absence of climate change. Furthermore, if no prevention and adaptation measures are taken by themed-century, yields in certain regions are estimated to be much smaller than in a situation of no water or climatic shocks. Corn, wheat, and maize, as well as cotton, sugarcane, and vegetables, will be particularly susceptible. The production of animal goods, such as milk, would be impacted as well. There is a strong understanding of the need to update and modernize business regulations; to improve the fortunes of smallholders, even by encouraging others to leave the sector; to improve the efficacy of food protection measures; and to fix looming water and environmental problems. Many policy proposals are either ongoing or in the works, and they are discussed in this report, which supports many of them while merely recommending that they be continued or strengthened. Additional guidelines center on allocating limited discretionary capital to investments that will improve stability and productivity while encouraging better-functioning markets to assess farmers' remuneration to a far greater extent in Pradhan Mantri Fasal Bima Yojana (PMFBY) as well as NAREGA schemes". Finally, a less stringent and more stable agricultural trading system covering both imports and exports is proposed, under which the sector's ability to lead to sustainable development and employment would not be completely realized in anenvironment with global supply chains.

CHAPTER 7

FINDINGS, CONCLUSION AND SUGGESTIONS

7.1 INTRODUCTION

In this chapter presented the final three stages of the research project i.e., findings; conclusion and suggestions of the study have been discussed under 'The Transformation of Agricultural Land in Haryana and Its Impact on Rural Development'. "This research discussed objective wise data collection procedure from the first objective data collected on the basis of secondary data taken from Statistical Abstract of Haryana, Economic and Statistical Organization, Panchkula .The findings, and Region wise analysis, comparison of different parameters land use, cropping pattern, system of irrigation, crop combination analysis, ranking of crops, crop combination regions fertilizer, infrastructure facilities, andthe analysis will be region wise and period after formation of Haryana starting from 1966 to 2018 . Secondary data will be analyzed by correlation and regression to find out the relationship and cause effect between variables. Second objective data collected from same secondary current Published reports, journals, statistical abstract of Haryana and some published sources that contained information about the Agricultural background of the Haryana. The duration of the present situation is 2015-18 among district of Haryana state and same analysis on current basis. The third objective data studied by primary data collection or case studies from various districts of Haryana from 286 respondent interviewed under Important parameters. Rural economic development, rural social development, infrastructure development, female literacy rate, gender ratio, employment structure, agricultural intensity, crop selection model, agricultural income, labor productivity. The last fourth objective explore the major policies, programs of agricultural and rural development in the study area with impact of its implementation, was obtained the secondary data from Policies, programs for agricultural and rural area from reports, Review and analysis of national policies and programs (Content analysis), suggestions and recommendations for sustainable rural development as per our context. After whole data analysis, this chapter was presenting the conclusion and suggestion with respect of our research context.

7.2 FINDINGS

7.2.1 Demographic Details of the Participants

Researcher have concluded that out of 286, respondent as farmers, 13.6 per cent of them werebelow 20 years, 35.0 per cent of them were of both 21 – 35 years and 36 – 70 years and 16.4 per cent of them were of more than 70 years who participate in interview, out of 286 farmers, 40.9 per cent of them were married, 31.8 per cent of them were unmarried and 27.3 per cent of them were got divorcee as marital status. It was found that 54.2 per cent of them were male, 45.8 per cent of them were female and it is good response of female participant in agriculture, 64.6 per cent of farmers were Hindu, 10.9 per cent ofrespondents were Muslim, 18.9 per cent of farmers were Sikh, 3.9 per cent of farmers were Christian and 1.7 per cent of farmers were of any other religion such Buddhism and Jain. It was observed that 14.3 per cent of farmers had below 8^{th}, 17.5 per cent of farmer were 10^{th} pass, 17.8 per cent of farmers were 12^{th}pass, 14.7 per cent of farmers were graduated and 22.4 per cent of farmers were post graduated and 13.3 per cent of farmers had any other qualification of education. It was also found that 16.1 per cent of farmers' spouse had below 8^{th} pass qualification, 15.7 per cent of farmers' spouse had 10^{th} pass qualification, 18.5 per cent of farmers' spouse had 12^{th} pass as qualification, 19.6 per cent of farmers' spouse were graduated and 14.7 per cent of farmers' spouse were post graduated and 15.4 per cent of farmers' spouse had any other qualification of education. Where 19.9 per cent of them were as farmer, 21.3 per cent of them were as labour in farm, 18.9 per cent of them were in business, 18.5 per cent of them as students and 21.3 per cent of them had no any occupation. And if we talk about spouse 18.9 per cent of them were as farmer, 19.6 per cent of them were as labour in farm, 21.3 per cent of them were inbusiness, 21.7 per cent of them as students and 18.5 per cent of them had no any occupation. It was found that 19.2 per cent of farmers had below to 10000 as income, 19.6 per cent of farmers had between 10001– 20000 as income, 22.4 per cent of farmers had between 20001 – 30000 as income, 19.9 per centof farmers had between 30001 – 40000 as income and 18.9 per cent of farmers had above to 40001 as income and 56.0 per cent of farmers had one child, 24.5 per cent of farmers had between 2 – 5 children, 14.3 per cent of farmers had more than 5 children, 5.2 per cent of farmers had no any child. Total experience of farmer 24.5 per cent of farmers had 1 – 3 years of experience, 25.9 per cent of farmers had 4 – 5 years of experience, 22.7 per cent of farmers had above to 5 years of experience, 26.9 per cent of farmers had no any of experience in which 71.0 per cent of them said Yes for socially better than other by respondents and 29.0 per cent of then said No for

it.

Study has concluded after analysis of variance (ANOVA) between age group with factors affecting the agricultural social factors such as rural social development, female literacy, gender ratio, employment structure, rural economic development, agricultural firm income, crop selection pattern, infrastructural services development and impact challenges. Only gender ratio, rural economic development, crop selection pattern and impact challenges showed the significant impact on age, impact on marital status, gender, religion, both education status, both occupation, number of children, experience of respondents on social development.

7.2.2 Land Area Distribution, Production, Irrigation

Yamunanagar district has more land under forest area which area has 269614-hectare square, than Panchkula district has forest area which area has 147220-hectare square. Similarly, Mewat and Jhajjar have the least land under forest area which area are 4795and 7652.

Bhiwani, Hisar districts have more land area under non- agricultural uses which area 869189 and 822608 -hectare square, than Yamunanagar district has land area under non – agricultural uses which area has 605418-hectare square. Similarly, Sirsa and Palwal have the least land area under non – agricultural uses which area are 340169 and 148018 – hectare square".

Bhiwani and Sirsa districts have more land area under Net Area shown which area 7880315 and 7701221 -hectare square, than Hisar district has land area under Net area shown which area has 6774479-hectare square. Similarly, Panchkula and Palwal have the least land area under Net area shown which area are 641219 and 1045877 – hectare square

Production for Wheat: Sirsa District is top the production for wheat which production is 5085765 tons and Panchkula is the least in the production of wheat which production is 219717 tons

Production for Rice: Karnal and Kaithal District are top the production for rice which production is 3162501 and 3020935 tons and Mahendragarh is the least in the production of rice which production is 120 tons.

Production for Bajra: Hisar and Rewari District are top the production for bajra whichproduction is 543801 and 498564 tons and Ambala is the least in the production of bajra which production is 60 tons.

Production for Barley: Bhiwani and Rewari District are top the production for barley which production is 141307 and 126204 tons and Ambala is the least in the production of wheat which production is 105 tons.

Production for Jowar: Rohtak and Jhajjar District are top the production for barley which production is 337581 and 308729 tons and Ambala, Sirsa, Panchkula are the least in the production of wheat which production is 0 tons.

Production for Maize: Sonipat and Kurukshetra District are top the production for barley which production is 7833 and 6962 tons and Rewari is the least in the production of wheat which production is 3 tons.

Production for Pulse: Bhiwani District is top the production for barley which production is 232285 tons and Panchkula is the least in the production of wheat whichproduction is 535 tons.

Irrigation Area of land for Wheat: Sirsa and Fatehabad district are top for irrigation ofwheat for production which area are 50857650- and 5431411-hectare square and Panchkula district is the least in irrigation of wheat for production which area is 219717-hectare squares.

Irrigation Area of land for Rice: Karnal and Kaithal district are top for irrigation of rice for production which area are 3162501- and 3020935-hectare square and Mahendragarh district is the least in irrigation of rice for production which area is 120-hectare squares.

Irrigation Area of land for Bajra: Hisar and Rewari district are top for irrigation of Bajra for production which area are 543801- and 498554-hectare square and Ambala district is the least in irrigation of wheat for production which area is 60-hectare squares.

Irrigation Area of land for Barley: Bhiwani and Sirsa district are top for irrigation of Barley for production which area are 141307- and 126204-hectare square and Panchkula district is the least in irrigation of Barley for production which area is 105- hectare squares.

Irrigation Area of land for Jowar: Rohtak and Jhajjar district are top for irrigation of Jowar for production which area are 337581- and 308729-hectare square and Fatehabad district is the least in irrigation of Jowar for production which area is 0- hectare squares.

Irrigation Area of land for Maize: Sonipat and Kurukshetra district are top for irrigation of wheat for production which area are 7833- and 6962-hectare square and Mewat district is the least in irrigation of wheat for production which area is 3-hectaresquares.

7.2.3 Irrigation Pattern

Sirsa, Hisar and Jind are the district of Haryana which have more land area for canal for irrigation in the crop and similarly Ambala, Panchkula have less land area for canal for irrigation of crop.

Tube well as Irrigation System: Kaithal, Kurukshetra and Karnal are the district of Haryana which use more tube well for irrigation in the crop and similarly Rohtak, Mewat and Palwal have use a smaller number of tube-well irrigation of crop.

Other sources as Irrigation System: Sirsa, Hisar, Bhiwani and Karnal are the district of Haryana which use more other sources such as well tanks, other wells and gross canal for irrigation in the crop and similarly Mewat and Palwal have use a smaller number of other sources irrigation of crop.

7.2.4 Decadal Transformation Trend of Agricultural Land and its Courses

The trend of crop intensity is still continuing from 1966 to 2018; however, it has reached to almost saturation level of 83 per cent of the net cropped area of the state. Use of land for agricultural used remained almost same whereas use of land in non-agriculture was decreasing gradually. Similarly, with the use of land in forest also decreased. There were three types of land holding in Haryana such as individual holding, Joint holding and Industry holding. The wheat avers recorded a positive growth with an addition of 4389 thousand hectares under cultivation whereas 1932 thousand hectares of land previously cropped under jowar, bajra and pulses has been reduced. Study has confirmed the above-mentioned concentration of paddy and wheat cultivation of the total cropped area. The traditional crops such as maize, barley, bajra and pulses

form 9.12 per cent of the total cropped area, On the other hand, barley, bajra, jowar, maize and pulses have witnessed drastic downfall in the overall production and total area cropped throughout the last forty-nine years. The commercial crop such bajra, barley and cotton have witnessed drastic increased in the overall production. On the other hand, oils crop such as sunflower and Tori have also witnessed of increasing in the overall production. Wheat, oilseeds and cotton have recorded a positive growth and maize, barley, bajra and pulses has been reduced. Therefore, total cropped area and overall production of various crops in Haryana reflect consistent expansion and dominance of paddy and wheat in the state. On the other hand, barley, bajra, oilseeds, maize, cotton and pulses have witnessed drastic downfall in the overall production and total area cropped throughout the last forty-nine years. The high variability in its production indicates that it may have been adopted in water scarce regions, as irrigation sources increased such well, tube-well, canal, more area got irrigated so the productivity of land increased. In 1966- 77 there used canal as the main sources of irrigation and ox as for plough the fields. But now instead of ox, the tractor is in used and tube wells and canal are used. There is drastic increase in consumption of fertilizers as crop and season requirement. There is drastic increase in consumption of pesticides as crop and season requirement. Agricultural area was reported as par permission commission of state. Bhiwani, Faridabad, Kaithal, Panipat, Rewari and Yamunanagar were reported; these districts got the agricultural land from the native district. In analysis, barren and uncultivable uses and forests uses land were decreasing. Net area sown, cultural area, area sown more than once were increasing. As a result, the farmers were shifted towards rice and wheat from coarse cereals and pulses in Haryana as Haryana is one of the states which was highly affected by the green revolution. In 1969-71, Government canals were 971.5 KM with zero tube wells, which made irrigation up to 40.4 per cent of net area sown and in 2009-11, the canals were 1214.5 km with 1764.5 tube well par 000 hectare made irrigation of 84.75 per cent of net area sown. There was 6579.7 per cent increase in fertilizers. It showed the higher dependency on fertilizers. There was 1108.6 per cent increase in pesticides par 1000 hectare. It also showed the higher dependency on pesticides. There was 2993.6 per cent increase in number of tractors. It also showed the improvement in agriculture. The districts are arranged in an ascending order of rice and wheat specialization for the given period. Crop combination study can be greatly helpful for regional agricultural planning and optimizing income of farmers. Districts Bhiwani, Hisar and Sirsa have 5 crop combinations, similarly, Gurugram, Jhajjar, Jind, Mahendragarh, Rohtak and Sonipat have 4 crop combinations.

7.3 CONCLUSION

Haryana's rural transition is largely distinguished by increased rural socio-economic growth and enhanced infrastructural facilities, both of which have substantially improved the standard of life in rural areas. To summaries', Haryana's strong economic growth has resulted in major changes in both rural transition and rural production. Rural India, on the other side, tends to lag behind urban regions. The policy assumption is that more attention should be paid to rural areas in order to close the urban–rural divide. To reverse the pattern of urban–rural divide, more powerful interventions are required, such as improving rural sanitation systems, irrigation intensity, and technical support from industry and urban areas to agriculture and rural areas. Now we have concluded that the variables which affected more on the land transformation. All variables i.e., Agricultural farm income, gender ratio, female literacy, rural economic development and infrastructural services development pattern selection showed the significant p value with land transformation. So, we concluded that all variables had significant effect on the land transformation. From the objective 1 explore the transformation of agricultural land in the state of Haryana Starting from 1966 To 2018, For this, only the land use pattern of Haryana such as forest, baren land, and agricultural land has been changed regularly in statistical abstract of Haryana, the land use pattern and the crops pattern have been taken. If the districts keep changing every decade, then the district which included in the district from which it is formed continuously rural zone converting to urban zone under change in land use: here we have studied the change in agricultural land (increase or decrease) that in which category it is getting transformed along with the intensity of this change. In this, we have seen that various changes in agricultural land have reduced or more, the land which has been reduced to agriculture, where it has gone, in the built-up area or in the forest reduces. From objective 2, analyzed the present situation of agriculture in Haryana in terms of its productivity and cropping pattern. We have found that Demarcation of the agro-climatic zones of Haryana: here the state of Haryana will be divided into three agro-climatic zones based on few earlier studies and agricultural and climatic characteristics. The agro climatic zone indicator is from the cone, how many zones Haryana is divided into and on which base, Comparative study of these zones: here a comparison of the level of agricultural development among these zones will be made. This comparison shall be focused on irrigation intensity, cropping intensity, production of different crops, yield, agricultural productivity etc. Now under the fourth objective to explored the impact the agricultural and rural development at micro level with case studies of some sampled villages with 286 respondent interviews this was given in finding section in more detailed. The fifth

objective is to explore the Implementation and Impact of Major Policies, Programs of Agricultural and Rural Development. It describes the main policy configurations and provides summary indicators to quantify policy efforts. Evaluate policies based on their ability to achieve sustainable productivity growth and food security, and suggest ways to improve policy performance as needed.

7.4 SUGGESTIONS

This research proposes a series of changes that, if adopted, will establish a new operating and regulatory system in which market participants will play a greater role; remove systemic changes and barriers to modernization of processing and delivery; and will enable agriculture "The food sector can adapt to changing market demands; ensure that publicly funded programs do not increase environmental damage or climate change, or increase pressure on limited resources such as electricity; This will ensure that food protection is achieved faster and at a lower cost; And to ensure that publicly funded projects do not exacerbate environmental damage or climate change, or increase pressure on scarce resources such as electricity.Rather, available capital will be invested in infrastructure for creativity, adaptation to climate change, resource management and long-term productivity growth; (ii) Direct transition (digression) support for farmers can be incorporated into the emerging DBT framework and paid for using the Aadhar system; (iii) Disaster plan with activation conditions and payment requirements. Chapter 7 offers more or less suggestions, respectively.

This study proposes a series of changes that, if adopted, will: establish a new operating and regulatory system in which market agents will play a more important role; remove barriers to the transformation and modernization of processing and delivery systems; and enable the agri-food sector Adapt to the changing needs of the market; ensure that publicly funded programs will not increase environmental damage or climate change, or increase the pressure on limited resources such as electricity; this will ensure that food protection is achieved fasterand at a lower cost; it will ensure that public The funded projects will not exacerbateenvironmental damage or climate change, or increase the pressure on scarce resources such as energy. On the contrary, the available capital will be invested in creativity, climate change adaptation, resource management and long-term productivity growth infrastructure; (ii) Direct transition (digression) support for farmers can be incorporated into the emerging DBT framework and paid through the Aadhar system; (iii) Disaster plan with trigger conditionsand payment requirements

7.5 FURTHER AREAS OF STUDY

India has been carrying out one of the world's biggest agricultural, reforestation and cooperative forestry projects, restricting the conversion of forests to cropland. As a consequence of the introduction of the 1980 Land Protection Act and the 1988 Collaborative Forest Management law, India's deforestation rates have decreased after 1980 (Ministry of Environment, 2015). Forests are India's second most important land use group, after agriculture (24.2 per cent of the total area). Urban and commercial growth, on the other side, is placing strain on both farm land and woodland areas: the share of land used for non- agricultural purposes rose from 6.8 per cent in 1995 to 8.2 per cent in 2014".

Most of the study was undertaken in District of Haryana, as well as the thoughts of many committees, government departments, and think tanks, point in the same direction with other state also required this kind of study to analyze the actual problem faced by farmer with respect of continuous agricultural land transformation. Moving to a direct profit method will save money, increase targeting, improve diet outcomes, and could be configured to respondto special conditions faster than physical delivery. It will also encourage agricultural sector to play a bigger role in deciding both farmers' and consumers' output decisions. Reforms along these lines will also have the added benefit of opening up several avenues for a satisfactory resolution of the 'public stockholding' problem, which has been a major roadblock to success in the WTO's multilateral trade negotiations. Timing and sequencing, as with the other improvements proposed in this research, would be important, as adjustments will need to be strategically prepared and introduced steadily and slowly over time.

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