ECONOMIC CAPITAL PLAN

1. Introduction

Integrated management of economic, physical, and social resources in a spatially confined area is referred to as regional planning (Johnson, 2015). This strategic implementation of plans and policies is an ancient practice. Moreover, this has been extended to civilized regions in the modern era. The logic that strengths this philosophy is that through regional planning complications in urban and environmental lagging can be addressed effectively (Lord & Tewdwr-Jones, 2015). Similarly, Wong (2015) explains visualizing the development of a city or a region in a spatial context is critical, and accounting for past and present association in planning and development can benefit the whole strategic process. Whereas, the central feature of the regional planning process is to benefit the community as a whole (Silva, 2015)

Economists usually divide the private sector into two segments i.e. households and businesses. Businesses are defined as an area of economic productivity and exchange. And within businesses, each productive unit is known as a firm (Cohen, 1979). These productive units combine to form an industry (Porter, 1980). The addition of a new firm can boost productivity via three main routes as follows: by elevating existing knowledge and technology; by introducing new technology, methods of production, or knowledge; or by enhancing regional capability by creating business opportunities and elevating the potential of overall industry (Martin, 2010; Tödtling and Trippl, 2013). However, the very initial performance of a firm in terms of job creation (Henrekson and Johansson, 2010) and economic outcomes (Alsos, Carter and Ljunggren, 2014) is supportive in predicting the future of regional development and can also help policymakers in devising relevant strategies or policies to attain anticipated trajectories (Rypestøl, 2017). Furthermore, the evidence reflects that regions with the presence of capital goods industry not only benefit the adaption but also create innovative production opportunities; these benefits are not limited to a particular zone but also lead to enhancements in corresponding regions (Pottier, 2015).

2. Bahawalpur Region's Geographical Overview

Within the province of Punjab, the largest administrative region in terms of area is the Bahawalpur division. This region has borders attached with India from the south and southeast range, Sindh through KLP road, and Baluchistan. This division is divided into 3 districts: Bahawalnagar with a population of 2,981,919 on 8778 km^2, Bahawalpur with 3,668,106 on 23, 987 km^2, and Rahim Yar Khan on 4,814,006 with 12, 545 km^2.

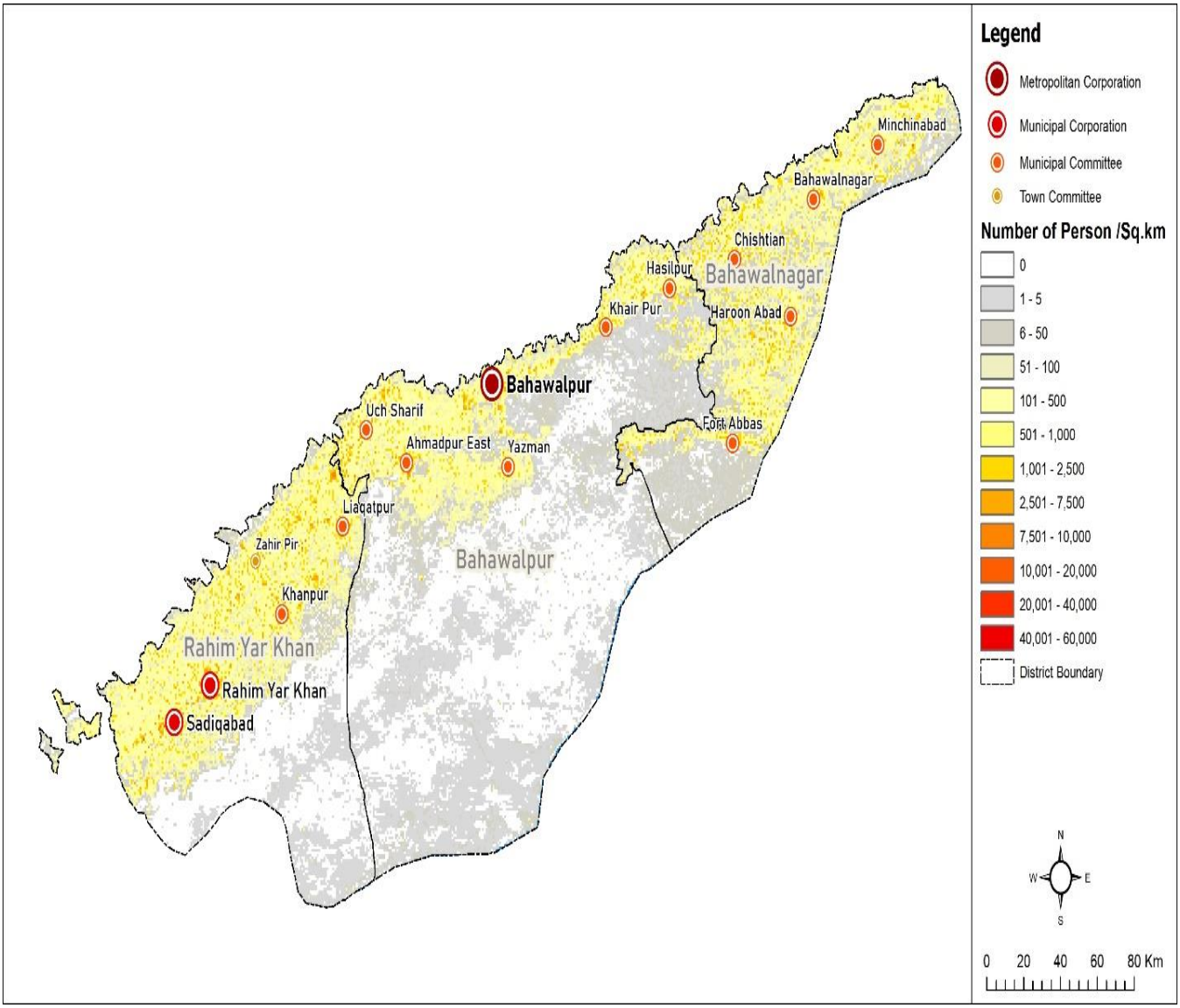


Figure 1: *Bahawalpur Divisions Outlay, Developed by Urban Unit GIS Team*

3. Economic Outlook of Bahawalpur Region

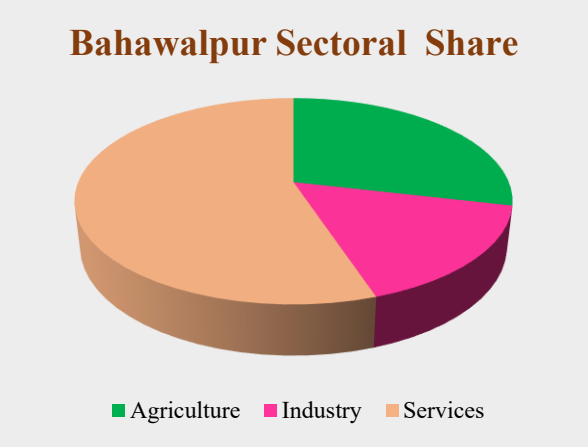


Figure 2 Sector wise Labor Division of Bahawalpur Region

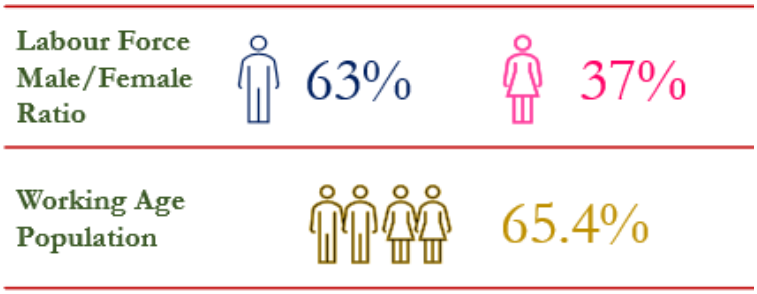


Figure 3: Labor Force Formation

75% of its population in the Bahawalpur division lives in rural areas, and only 25% resides in urban localities. Furthermore, as displayed in figure 2, 56.26% of the region's labor force is allocated to agriculture, 26.8% works in services and only 16.9% is allocated to industry. Similarly, the gender distribution is exhibited in figure 3, and it is identified that 63% of males and 37% of females are employed in this region. These statistics reflect rural-urban, sectoral and gender gaps of this region. Thus, there is an immediate need of policy consideration to stabilize prevailing condition and enhance economic opportunities.

Since 1951, this division has not transformed itself as per modern economic needs. Figure 4 is a sectoral comparison of the years 1951 and 2018 between different regions of Punjab. As can be retrieved from this figure, in 1951 share of agriculture in economic activity was 74.9% while service and industry together

contributed 25.1% in the country. In 2018 this transformation has increased to 58.26% in agriculture 20.68% in industry and 26.82 in services

Furthermore, transforming the agriculture sector is a milestone towards modern hi-tech development. The surplus of agriculture is invested in MSME and by creating enabling environment through policies, projects, and interventions these MSME are developed into large units and MNC's. Moreover, Rostow's Growth Model suggests development go through five stages of transitions. And, this process involves stepping up from agriculture to industry to services. Likewise, the transformation of an economy from agriculture to industry signifies the process of industrialization.

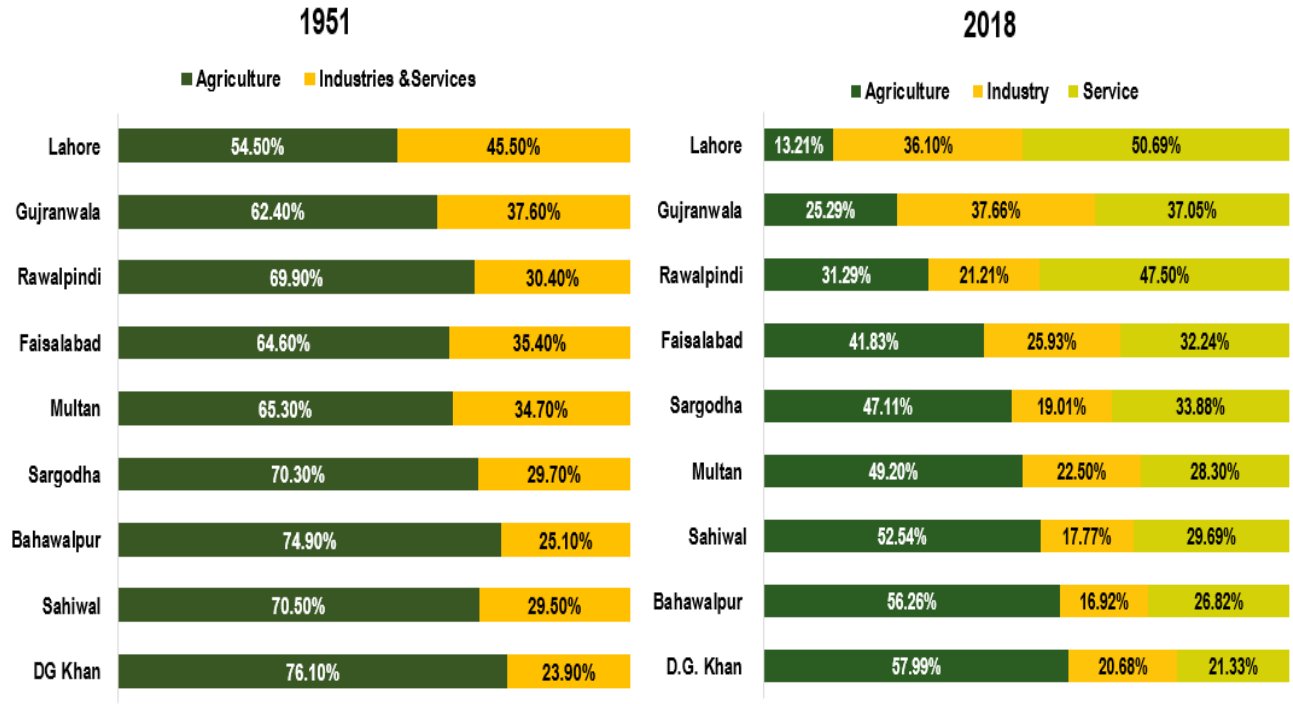
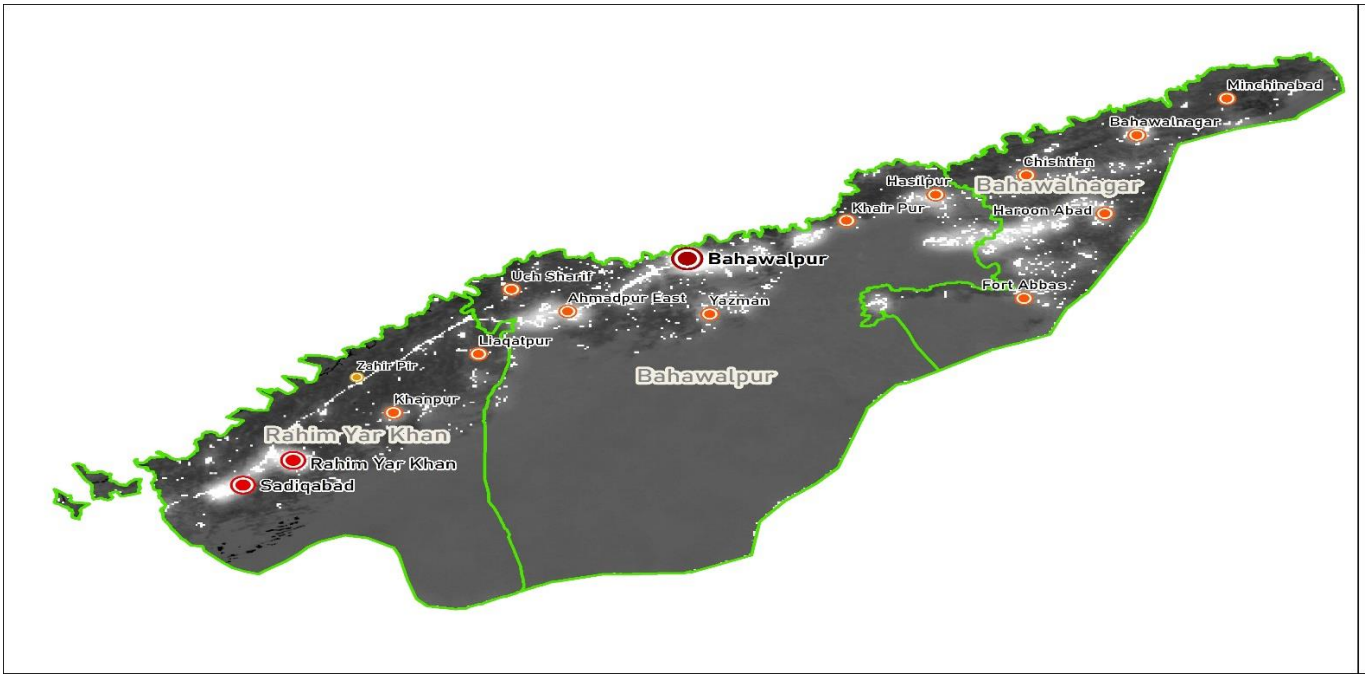


***Figure 4**: Sectoral comparison between 1951 and 2018.*



Map 1: Night light Intensity Map of Bahawalpur Region

Source: Urban Unit

Figure 5 describes the night light intensity map which explains any economic activity in the region during the night. From this, economic activity has been observed within the urban limits of the Bahawalpur region, along major roadsides, mainly around the national highway 5 connecting the Lahore Karachi. Hence, it can be deduced that the potential of this division is more diverse than its current production level.

Within the Bahawalpur region, the industrial sector has huge potential. However, the number of units in each industry is far less than it can efficiently establish. In other words, the total number of industries must be increased that can accommodate more demand through increased supply, both on a national and international level. Out of the 42,523 km^2 area here, the 25,800 km^2 is a desert area. Moreover, 3 districts and 17 tehsils are agrarian. Another highlighted feature is that it can also provide economic opportunities related to tourism and the industry associated with tourism.

AGRICULTURE DEVELOPMENT PLAN

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LIST OF ACRONYMS

Punjab Spacial Strategy	PSS
Gross Domestic Product	GDP
Annual Development Programme	ADP
Total Factor Productivity	TFP
Food and Agriculture Organization	FAO
Foot and Mouth Disease	FMD
Punjab Livestock and Dairy Development Authority	PLDDD
Livestock and Dairy Development Board	LDDB
Value Chain Analysis	VCA
United States Department of Agriculture	USDA
Pakistan Dairy Development Company	PDDC
Ministry of Food Agriculture and Livestock	MINFAL
Civil Veterinary Hospitals	CVH
Civil Veterinary Dispensaries	CVD
Artificial Insemination Centers	AIC
Artificial Insemination Sub Centers	AISC
Sahulet centres	SC
World Trade Organization	WTO
Trade Development Authority of Pakistan	TDAP
Public Sector Development Project	PSDP
Pakistan Dairy Association	PDA
Good Agricultural Practices	GAP

DISCLAIMER

Urban Sector Planning and Management Sector Unit (Pvt.) Ltd. has prepared this report on the Agriculture Development Plan of Bahawalpur Division. Maximum care and caution have been observed while developing this document.

The opinions expressed in the document are solely those of the authors and publishing in any way constitutes an endorsement of the opinion by the Urban Unit.

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EXECUTIVE SUMMARY

Agriculture serves as the backbone of Pakistan's economy. Even though the share of the agricultural sector in the GDP has dropped significantly over the years, the sector continues to play a significant role in the socio-economic framework of the country. Around 60% of Pakistan's population lives in rural areas, with the majority relying on agricultural activities for a living. Similarly, Punjab shows a significant contribution to agriculture. The major crops of Punjab are wheat, cotton, rice, sugarcane, citrus, oilseed, and various fruits and vegetables. However, the Bahawalpur division contributes the maximum share in the Punjab agriculture production. In recent years, the yield of most crops and livestock products in Pakistan suffers from a downward trend. Furthermore, large gaps in productivity persist in most crops, diversification and a shift to higher value-added agricultural commodities have been limited, particularly in the crops sector. Increasing water shortage, decreasing soil fertility, degradation in water quality, and constraints on expanding agriculture areas, contribute to lower yields and production. With limited policy and financial support, the transition from cash crops with low crop diversification to the production of high-value commodities is challenging. Despite this extensive network and favorable growing conditions, productivity remains a challenge. Similarly, livestock productivity, preventive health standards, and quality are below world benchmarks. Feed shortage, limited knowledge of farmers in livestock production, the poor genetic potential of indigenous cattle breeds, disease, and land shortage are the main constraints affecting livestock production. The reasons are not only linked with the genetic potential of the breeds but with wider market issues as well.

Several interventions were introduced by the Government over the past few years for productivity enhancement. However, these interventions could not result in a significant increase in productivity. One of the main reasons for the failure of such interventions is not focusing on the comparative advantage of each area/zone and the value chain development approach. Therefore, all major and high-value crops will be cultivated in specific zones is the main focus of the plan. In such zones targeted infrastructural support will be provided to enhance agriculture and livestock productivity. This regional plan of agriculture development aims to improve the agricultural infrastructure and knowledge exchange by ensuring a zoning and value chain approach.

The Bahawalpur region plan focuses on the productivity enhancement of the agriculture and livestock sector. A detailed agriculture and livestock sectors diversification and transformation plan has been

provided to transform subsistence agriculture into high-value export-oriented agriculture. It is designed to ensure integrated planning that aims to structurally transform Bahawalpur into an economically developed region. This plan measures the performance of the agriculture and livestock sector using the primary and secondary approaches.

The Bahawalpur division faces severe productivity, inefficiency and other problems like the water availability at farms is inadequate due to wastage and inefficient use, caused by a lack of modern water distribution infrastructure. This results in low productivity despite the potentially favorable soils in the division. Also, the rural population, the backbone of the agriculture sector, is comprised mainly of smallholding, poor farmers who lack access to modern farming methods, machinery, transportation, storage facilities, electricity, inputs, and improved seeds. In addition, low-value addition in agriculture produce especially in high-value crops has prevailed**.** Moreover, the market system of the division is inefficient due to which the markets are located in isolation and are not within reach of the farmers.

To address the problems, the identification and specification of the cluster/zone for each crop based on the agroecological zone are recommended to increase and sustain productivity. As a result, 22 crops out of 67 are recommended for the Bahawalpur region based on agroecological conditions, production, yield & values. After the identification of these 22 crops, we proposed interventions to develop a complete value chain for these crops starting from provision of the certified seed to, specialized extension services, quality inputs, mechanization, packaging, storage, transport, harvest, post-harvest management, and market development. Proposed interventions are consulted with relative stakeholders such as the Extension and Research wings of the Agriculture Department and other stakeholders. To optimize the agricultural value chain, interventions are linked with the crop zones/cluster. These interventions are incentive-based; the farmers for the adoption of only the selected 22 crops in the Bahawalpur region will be incentivized. To this end, high-value cropping zones have been identified in the Bahawalpur region that can lead to maximizing yield per area of land utilized.

The proposed investment projects include both the ADP ongoing and new projects with few that need to increase the scale of the ongoing projects. These projects are divided into different phases, projects will prioritize according to the value chain components. For example, provision of the certified seed is the first phase, the second phase would be the provision of cold storage and processing industry. Because each phase is linked with the completion of the previous phase, there is a need for prioritization based on their relative order in the value chain.

1. INTRODUCTION

1.1 BACKGROUND

The agriculture sector contributes 19.2% to the GDP and generates 38.5% of the employment of Punjab's Labour force. This sector comprises crops, livestock, fishing, and forestry. Important crops in Pakistan include wheat, rice, sugarcane, cotton, and maize. Together, these crops account for 25.6 percent of the value-added in overall agriculture and 5.4 percent of GDP. The major crops occupy approximately 80 percent of the total cropped area. Notable minor crops include gram, oilseeds, pulses, onion, potatoes, and tobacco, and they account for 11.6 percent of the value-added in overall agriculture. Also, Punjab, the most populous province, accounts for an Agriculture contribution of 21% of GDP and employs 47% of the workforce. However, the agriculture sector of Pakistan and Punjab as well suffers from low productivity due to poor quality and inadequate agriculture inputs, poor farm management practices, limited availability of key agriculture inputs to the subsistence farmers due to limited knowledge, high cost, and limited accessibility. Small farmers are unable to make use of modern machinery due to their poor economic conditions and high cost of technology. Although large farms do use machinery and equipment, yet they are unable to match international production standards. Therefore, the share of agriculture in total GDP has been declining since independence in 1947. Agriculture contributed more than 50 percent to GDP in the 1970s. Moreover, compared to major crops, livestock had a smaller contribution in the 1970s.

Livestock comprises cattle, buffalo, sheep, goats, camels, horses, mules, poultry, and their products. Over the years livestock has emerged as the largest subsector in agriculture. The sector contributed 60.1 % to the agriculture value addition and 11.5 % to the GDP during FY2021 (Pakistan Economic Survey, 2020-21). More than 8 million rural families are engaged in livestock production and derive more than 35-40 % of their income from this source. According to FAO Statistics, Pakistan ranks 2nd in buffalo population in the world and ranks 4th in total Livestock population. Moreover, Pakistan stands at rank 12th in cattle milk production and 4th in goat population.

1.2 PROBLEMS IN AGRICULTURE AND LIVESTOCK

Agriculture is the backbone of Punjab's economy. However, the growth of the Agricultural sector has been constrained by shrinking arable land, climate change, water shortages, and large-scale population and labor shift from rural to urban areas. Another source of concern for crops is the high cost of inputs such as

fertilizers, pesticides, and seeds. Early generation seeds are scarce, and preliminary research is insufficient to create new varieties that can withstand pests, diseases, and climatological pressures.

Figure 1 below shows the yield comparison of some important crops in the Bhawalpur region as compared to progressive farmers and international best yields. Despite some progress, however, a huge productivity gap (about 60%) has been observed in all crops as compared with the world average. It is also observed that the gap between progressive farmers of Punjab and Punjab Average is also very high that show potential otherwise.

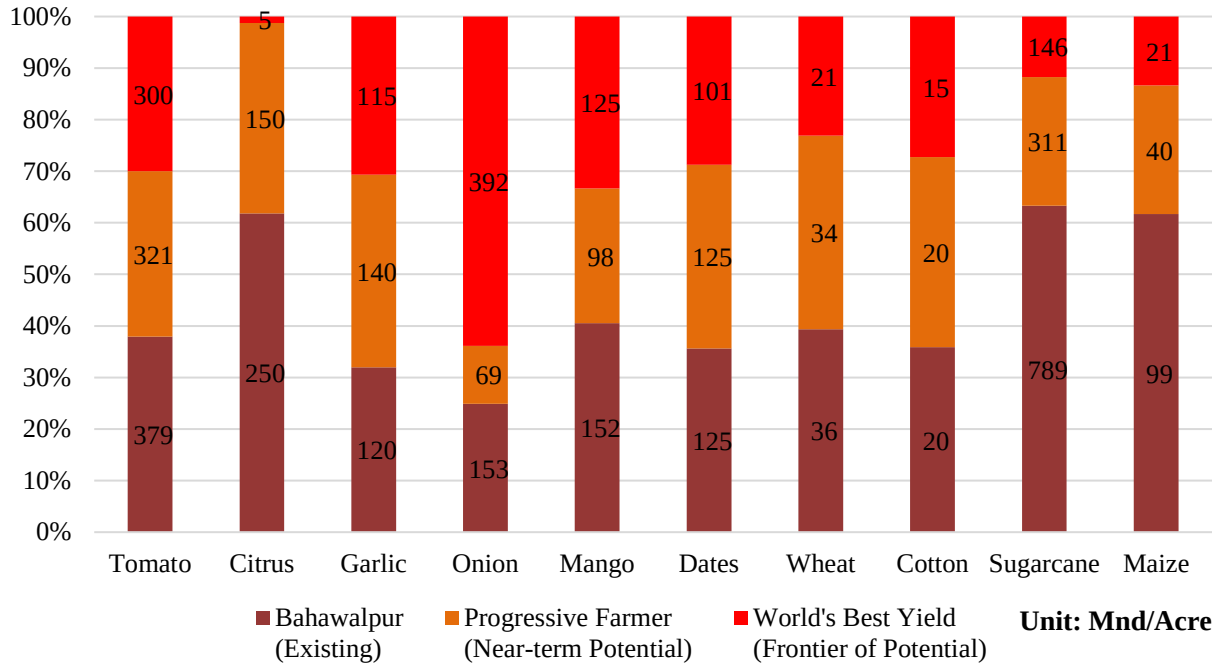


Figure 1: **YIELD COMPARISONS (MUND/ACRE)**

Source: FAO and Crop Reporting Service

1.2.1. ENABLING THE BUSINESS OF AGRICULTURE

Enabling the Business of Agriculture assists policymakers in assessing the agricultural regulatory environment. The study by (World Bank, 2019) investigates whether government-designed regulations and processes help or hinder domestic farmers' agricultural activities. It provides the components that track performance and identify impediments to agricultural market integration and innovation. The study uses eight indicators using a broad dimension of agriculture data. Enabling the business of Agriculture score

strongly links to broader development outcomes. Countries with better regulation, as measured by enabling the business of agriculture, have on average lower poverty rates. It suggests that the efficiency gains from higher productivity translate to better incomes for farmers and more employment opportunities for the rural population. However, Pakistan stands at the 70th position out of a total of 101 countries as shown in figure 2, and needs to improve the enabling environment about the enabling environment for faster growth of the agriculture sector.

RANKING	COUNTRY	SCORE
1	France	93.7
2	Croatia	92.68
3	Czech Republic	92.32
4	Hungary	91.77
5	Spain	91.71
6	Slovak Republic	91.55
7	Netherlands	90.69
8	Portugal	89.82
9	Austria	89.57
10	New Zealand	89.3
70	**Pakistan**	**48.87**

Figure 2: **ENABLING THE BUSINESS OF AGRICULTURE**

Source: Enabling the Business of Agriculture 2019

1.2.2. GLOBAL WATER PRODUCTIVITY GAP

The next problem of water availability is associated with the agriculture sector which is of immense importance. Water is essential for irrigation in agricultural production and has been a hot issue in recent times, not only in Pakistan but also all over the world as the shortage of water can affect the national economy very badly. Pakistan has one of the largest irrigation systems in the world with more than fifty million acres of irrigated land but unfortunately, water productivity in Pakistan as well as in Punjab is very low. It is evident in Figure 3, in which water productivity in Punjab is compared with two other countries India and the USA. Therefore, improving water efficiency is going to be a critical initiative to drive agriculture sector growth in Punjab.

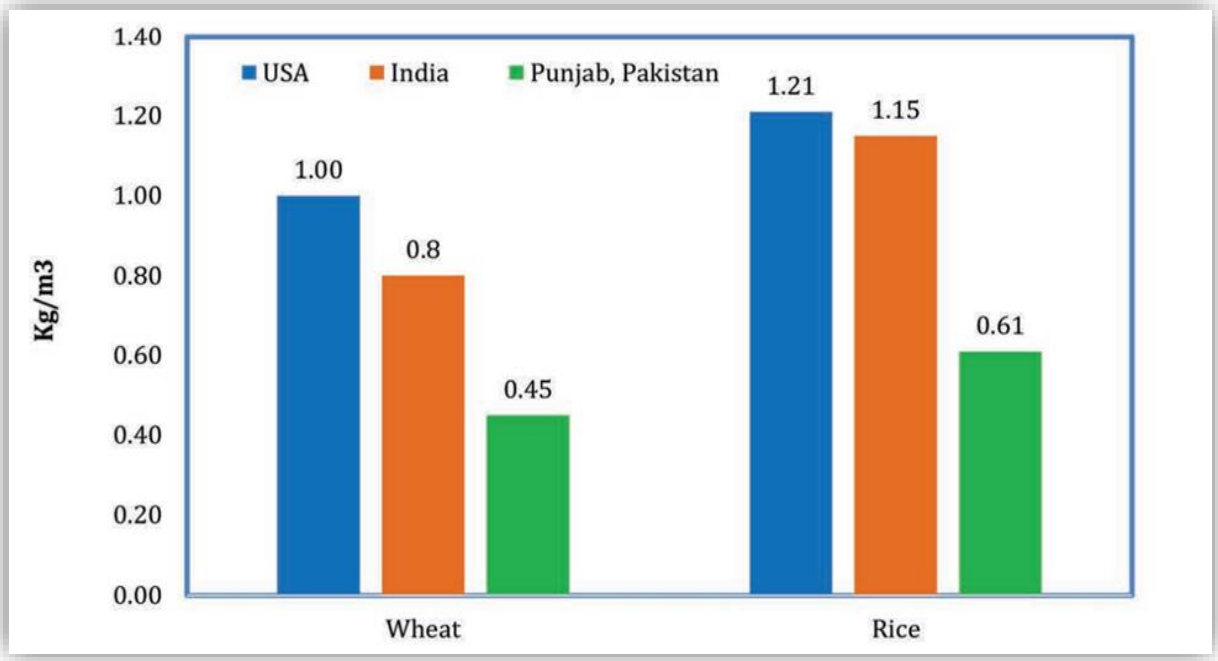


Figure 3: **GLOBAL WATER PRODUCTIVITY GAP**

Source: Agriculture Sector Plan 2015

1.2.3. TOTAL FACTOR PRODUCTIVITY GAP

Total Factor Productivity (TFP) in agriculture is currently the lowest in the region; and, it has been declining since the 1980s which is regarded as the golden period of Pakistan's agriculture. It is not only low and declining because of the large variations across regions and the size of farms while TFP has been stagnant. However, the growth is directly linked with greater input use rather than technological change or modern practices. Factors contributing to this decline include a lack of new seed varieties, the resistance of pests to existing pesticides, stagnant irrigation methods, decreasing soil health resulting from poor farming practices, as well as deficiencies and imbalances in fertilizer use, and a failure to leave the land fallow.

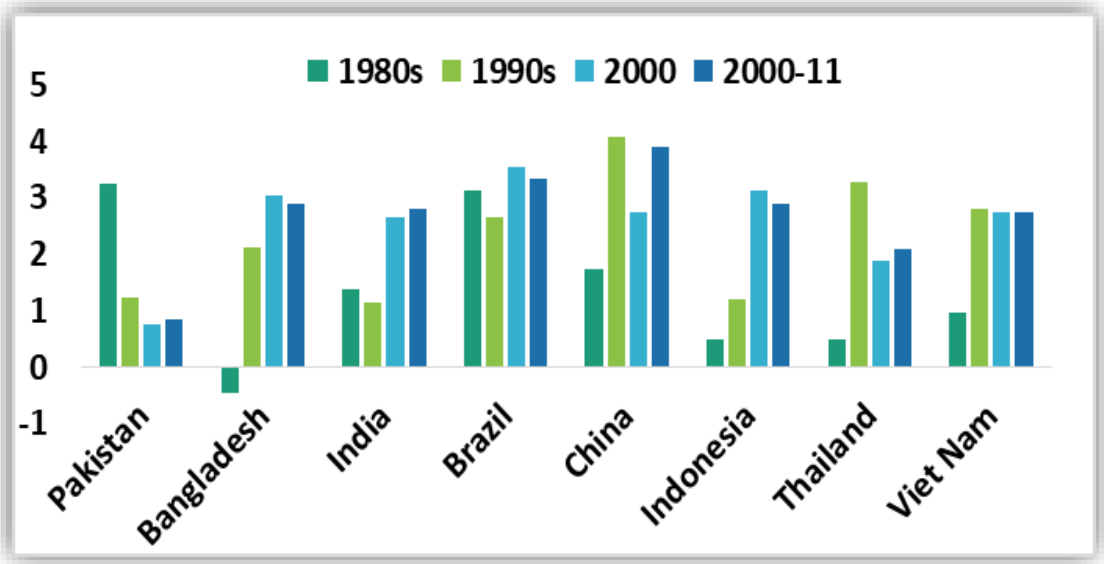


Figure 4: **TOTAL FACTOR PRODUCTIVITY SINCE THE 1980S**

Source: Agriculture Sector Plan 2015

1.2.4. STAGNANT LIVESTOCK PRODUCTIVITY

The yield comparison of milking cows (Kgs Per Lactation period) of the United States and Pakistan has been shown in figure 5 below. The population of the United States has decreased from 20.6 to 9.2 Million from 1976 to 2018 with an increase in production from 54.5 to 98.6 Million Tonnes whereas, in the case of Pakistan, the population has increased from 2.43 to 14.2 Million with an increase in the production levels from 2.1 to 19.8 million tonnes. However, the increase in production is due to an increase in population while the yield remains stagnant. Therefore, the gap in the yield of the Milking Cow exhibits the need for

interventions like; Breed improvement, Demand-driven applied research, Disease-free compartments, Provision of FMD vaccination, Market-based price mechanism, Milk and Meat Processing Units, etc. to increase productivity and exports substantially.

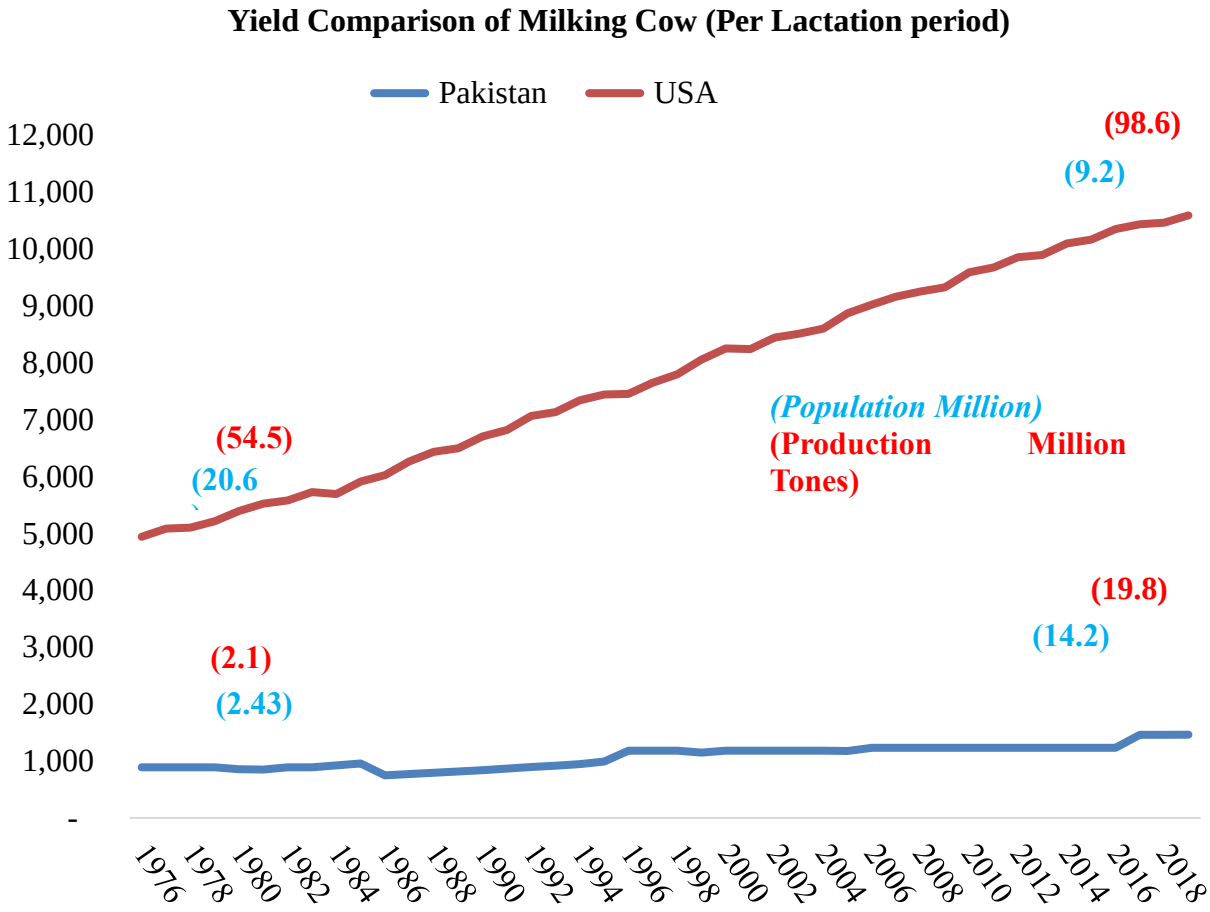


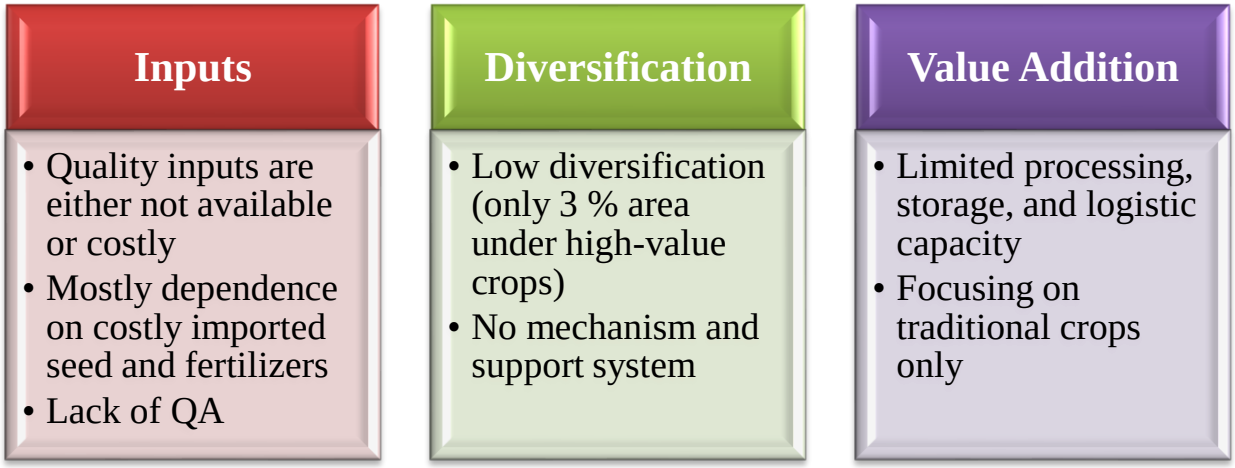
Figure 5: **YIELD COMPARISON OF MILKING COW (PER LACTATION PERIOD)**

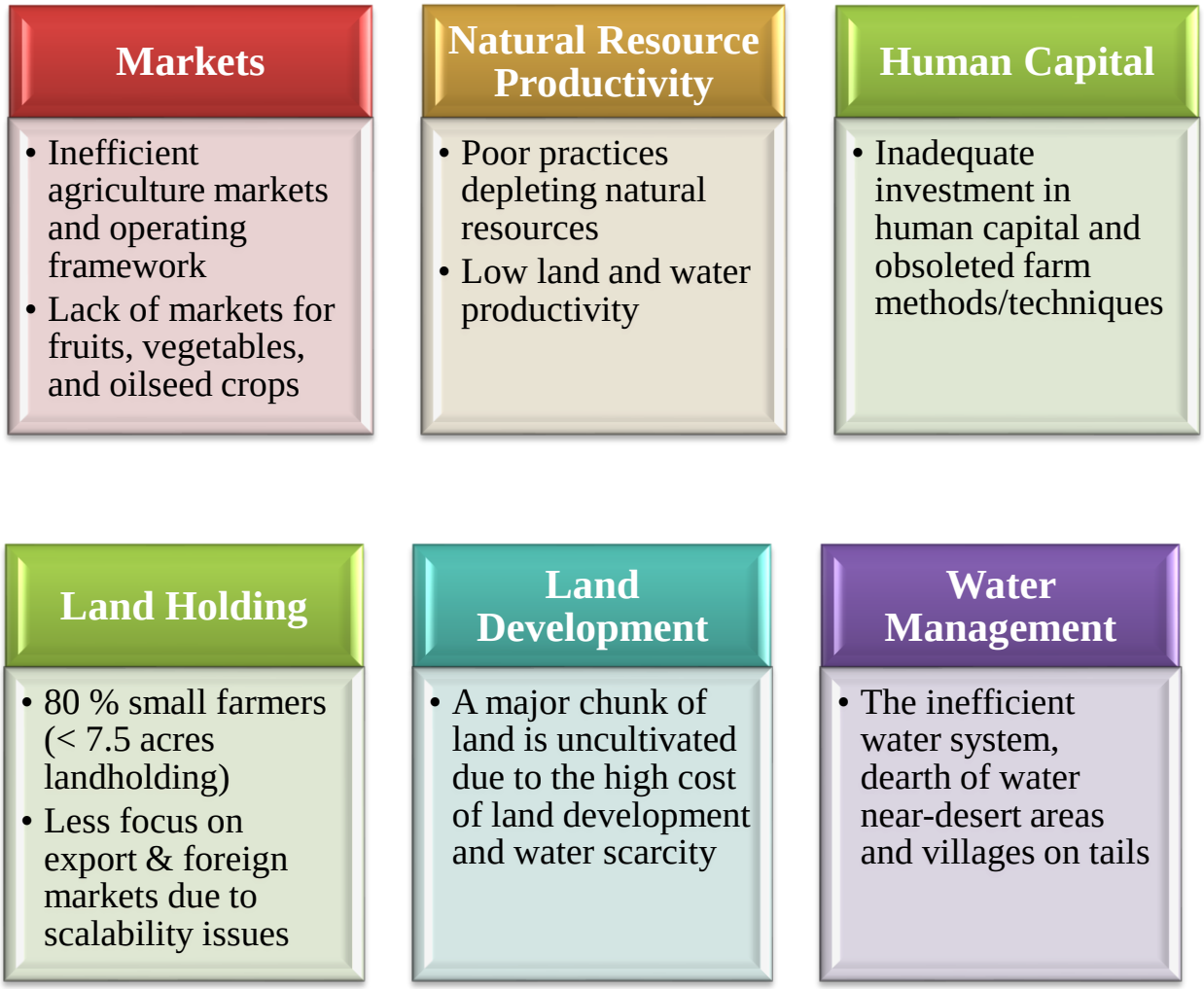
Source: FAO

1.3 ISSUES AND CHALLENGES OF AGRICULTURE

The problems highlighted above about the global water productivity, factor productivity, and stagnant livestock productivity described that the agricultural sector is critical to the growth of the economy, food security, job creation, and poverty alleviation, especially in rural areas. Therefore, increased agricultural productivity is central to sustainable economic growth, alleviating poverty and ensuring food security.

In addition, factors that hold back progress in the agriculture sector also include the inefficient distribution of irrigation water and lack of effective clusters of high-value crops, absence of timely adoption of new strategies and technology, policy distortions, and inadequate market development. Accordingly, various other issues and challenges to the agriculture sector (specifically for Bahawalpur) have been highlighted below:





1.4 LIVESTOCK ISSUES AND CHALLENGES

Livestock, which accounts for 60.07 percent of agricultural output and 11.53 percent of GDP, grew by 3.06 percent (Pakistan Economic Survey, 2020-21). The fishing sector expanded by 0.73 percent, with a share of 2.01 percent in agricultural value addition and 0.39 percent in GDP, while the forestry sector grew by 1.42 percent, with a share of 2.10 percent in agriculture and 0.40 percent in GDP. The issues and challenges faced by the livestock are discussed below:

Farm Productivity:
Inadequate quality of feed, breeding & nutrition services and labs and R&D facilities

Farm Management:
Poor farming practices & scarcity of medical and extension services, lack of institutional coordination

Value Addition:
Low processing & preservation mechanism, lack of product innovation and low product quality & human resource management

Markets:
Low standards, lack of certification, inefficient price mechanism, limited access to the global market and under developed supply chain

Keeping in view the problems, the Government needs to focus simultaneously on three broad strategies, the first one being to identify the potential areas for each crop and make cluster/zone of each crop and provide all facilities and specialized support system for each crop in cluster/zone particular to their needs. It will increase efficiency in the system (efficient use of resources like land, labor, water, inputs) and facilitate government to easily manage the whole value chain of each crop (management of inputs, extension services, technology, R & D, and providing subsidy).

Secondly, gradually shift crop-mix patterns from low-value crops to high-value crops by identifying potential areas of those crops. In this regard, identify some potential crops from high-value crops on a priority basis for the next five years and to develop a complete value chain for those crops. Crops such as Mango, Citrus, and Onion, are identified based on profitability; demand; high potential for value addition; export, and comparative advantage in international markets for the upcoming five years ultimately resulting in the growth of the agriculture sector in Punjab. Lastly, the yield of major and other crops (other horticulture, food grain, oilseed, and minor crops) can be increased so that the production is achieved from a limited area and hence the remaining area is optimally utilized to produce high-value crops.

Punjab spatial strategy is a long-term spatial development framework for the province of Punjab, across all sectors including agriculture, livestock, irrigation, food, forestry, industries, environment, urban planning, and social development. The strategy aims to ensure integrated spatial planning by identifying the comparative advantage of each area that will structurally transform Punjab into an economically developed region.

Furthermore, in PSS a comprehensive agriculture transformation plan was prepared which focuses on the comparative advantage of each region/division of Punjab. In this regard, the Urban Unit has been given a task to devise a comprehensive agriculture development plan for the Bahawalpur region which covers detailed agriculture and livestock plan by value chain of each potential/identified crop of the region.

2. REGIONAL PLANNING (SCOPE OF WORK)

The agriculture sector is one of the most important sectors of the economy of Punjab; an increase in agricultural productivity will make a massive contribution to increasing the growth rate of Punjab's economy. However, there is no spatial lens through which development projects can be assessed and evaluated for the targeted economic growth. Therefore, the Punjab Spatial Strategy focuses on the potential of economic growth in the agriculture of the province.

Considering the Punjab Spatial Strategy framework, the agriculture sector of Punjab must reposition itself to transform the agriculture sector in the province of Punjab to increase the crop productivity, bring the additional uncultivated area under cultivation and improve the crop mix to create maximum value addition in the province to contribute towards inclusive economic growth. This would be done through transforming the farmers of Punjab into progressive farmers, by equipping them with state-of-the-art support and knowledge and providing them with quality and timely inputs as well as through creating an enabling environment.

This work will be to develop and validate agro-ecological conditions and socio-economic profiling of agriculture and livestock sectors of the region focused on;

a. Assessment of physical environment (land cover, geology, natural resources, climate and meteorology, hydrology, population, land use, community social structure, etc) to determine optimal cropping pattern for intensification
b. Cropping pattern identification with yield, price, cost of production, profit per acre, etc
c. Proposed cropping pattern for intensification
d. Identification of problems in the product-level value chain (seed to market), resource, and financial constraints.
e. Proposing solutions and interventions at each stage of the value chain to enhance production and exports
f. Focusing on exportable surplus and finding value propositions for interventions leading to economic growth in the area
g. Water availability and utilization assessments for natural resource preservation
h. Economic activities (livestock and agro-based industries, employment, and labor market) assessments.

i. Key facilities assessments (agricultural markets, farm mechanization, breeding and seeding facilities, etc) for infrastructure and policy interventions

Therefore, the regional development plan on Bahawalpur Division focuses on the need to change our current cropping pattern from low-value crops to high-value crops. So that farmer income is increased and agriculture sector may flourish. This is achieved by making clusters of these high-value crops in the areas where we have a comparative advantage with respect to yield and productivity as well as suitable ecological conditions.

3. BAHAWALPUR AGRICULTURE SECTOR PLAN

3.1 VISION

The vision is driven by elaborating the policy areas, targets, key action, and stakeholders in the Bahawalpur division. The Agriculture Development Plan in the Bahawalpur region focuses on;

"Efficient use of resources to enhance productivity and generate value addition in agriculture through improving the regional and country positioning in terms of attractiveness and competitiveness by leveraging existing natural endowments for the economic wellbeing of people, especially rural communities"

3.2 OBJECTIVES

The main objectives of the regional plan for the agriculture and livestock sector are:

1. Enhance the competitive position of the agriculture sector to capture global demand and cater to domestic demand through the modernization of traditional agriculture practice.
2. Ensure food security by improving food quantity, quality, and nutrition diversity through higher yields and better crop mix and also increasing farmer profitability.
3. Enhance sustainability and resilience in the wake of climate changes by conserving agricultural resources through efficient use of land & water.
4. Strengthen and promote private sector participation in agriculture value chains with increased investment, technology infusion, and resource management.
5. Improving breed development, on-farm mechanisms, medical facilities, and providing high-quality nutritional feed for enhanced productivity.
6. Contribute towards poverty alleviation and economic development of the province through the provision of an enabling environment and farmer support services in the livestock sector
7. Incorporating modern processing technologies to move towards high value-added meat and dairy products.
8. Strengthen local markets and price mechanisms and increase accessibility to the international market by adopting international standards and certification.

3.3 POLICY FOCUS AREAS IN AGRICULTURE AND LIVESTOCK

To achieve the above-stated objectives, the following policy focus areas should be adopted strictly to increase the income of the farmer, improve their standard of living and bring overall development in the rural areas.

- Low productivity to high productivity (Lessening the productivity gap in all crops, livestock)
- Identify the potential areas for each crop and make a cluster/zone of each crop
- Provide all ancillary facilities and specialized support systems for each crop in the cluster/zone.
- Gradually shift crop-mix pattern from low-value crops to high-value crops (identifying potential crops from high-value crops on a priority basis for the next five years).
- Wasteful use of water to efficient use of water and develop 24 agriculture corridors along 24 main canals and focus on integrated rural development in these corridors.
- All Departments coordinate and implement integrated action plans by using the maximum agriculture potential.

To achieve sustainable development of livestock, dairy, and meat processing sectors in the Bahawalpur region, the following major policy areas are prioritized:

- Spatial zoning of the province for livestock production based on the locational advantages
- Nutritional values of soil, environmental and ecological conditions of each area shall be done
- And particular support services are provided for feed, fodder, silage, breeding, nursing, and disease control
- The area-specific coverage and results of extension services are also worked upon
- Supply chain management in the dairy, poultry, and meat sector is improved and developed
- Market distortions are removed by implementing minimum farm-gate prices for milk and meat producers
- Capacity building of farmers (livestock producers) along with the institutional capacity building to address the market gaps across the value chain shall also be ensured
- R&D for breeding, disease control, and establishment of Disease-Free-Compartments
- Earmarking Areas for livestock processing industries in Industrial Zones and Estates

4. METHODOLOGY

This section provides detail about the methodology used for the analysis.

The methodology adopted for this regional plan will be based on a mixed-method approach involving extensive literature review, collecting and analyzing both quantitative and qualitative data. Both primary and secondary data have been collected, analyzed, and interpreted accordingly. Moreover, primary data was collected through a field visit of the Urban Unit team to the Bahawalpur region and relevant interventions are being proposed for each crop separately. The following steps are discussed below:

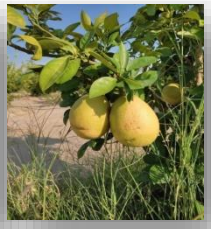
a. **Desk Research**: Review of existing documents, datasets, reports on agriculture.
b. **Stakeholders Consultation / Field Visit:** Next step, after the collection and review of secondary data, involved the ground trotting of the data and quality assessment of agriculture and livestock facilities through field visits/ stakeholder consultation. The stakeholders involved are the following:
    - Director Agriculture Extension
    - Director Agriculture OFWM
    - Director of Regional Research Institute
    - Field Visit-Bahawalpur (Farmers of Cotton, wheat)
    - Director Livestock (Research and Extension)
    - DG South Punjab Livestock
    - Research Farm Livestock and Agriculture
    - Field Visit-Bahawalpur (Farmers of Tomatoes, Onion, and Livestock)
    - Deputy Director Agriculture Extension
    - Deputy Director Livestock Wing
    - Field Visit-Rahim-Yar-khan (Farmers of Mango, Garlic)
    - Field Visit Rahim yar khan (Farmers)

c. Rapid Assessments – Field Visits

The Urban Unit Agriculture sector team visited the Bahawalpur division during August 2021

Chili Farming

Meeting with progressive farmer



Citrus plantation in desert area

Sugarcane

Discussion with Farmers

Water Capacity

Solar

LuffaFarming

Tunnel farming of cucumber

Agricluture Field

Cotton Processing Unit

Mango Farm

Meeting with Director extension BWP

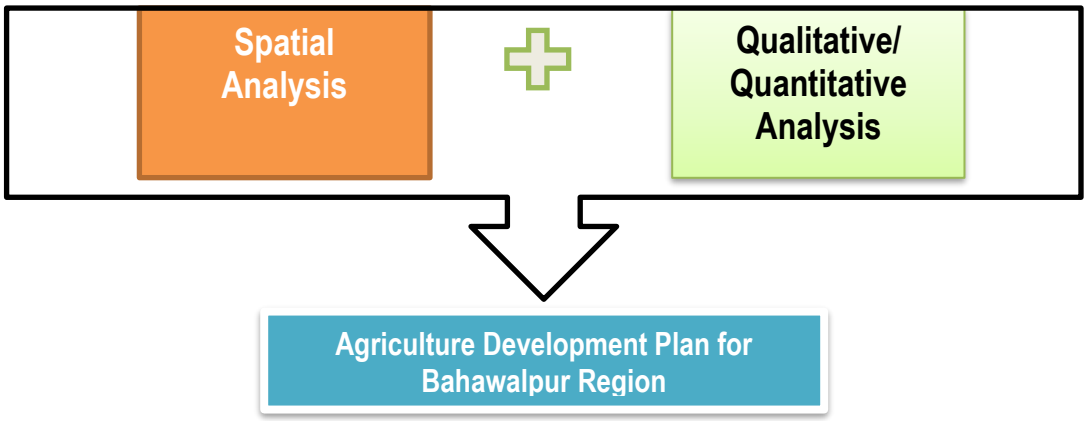
Onion Farming

Markets

d. **Data Analysis:** Analysis of primary and secondary data sources.

e. **Report Writing:** The final step will be a write-up of the Agriculture and Livestock Sector on the Bahawalpur Regional Plan.

All these steps would entail the following level of analysis:

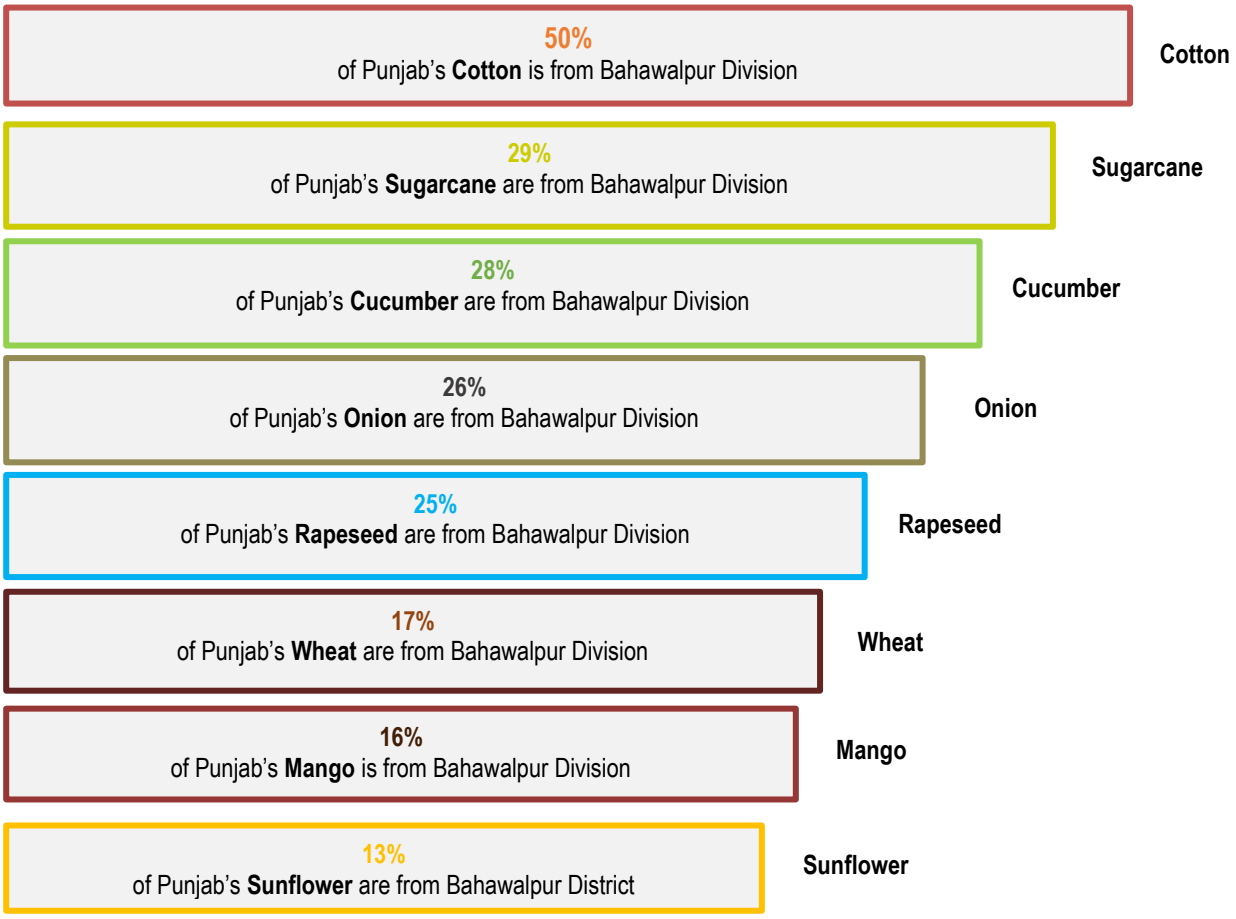


5. BAHAWALPUR AGRICULTURE SNAPSHOT

5.1 POTENTIAL CROPS IN BAHAWALPUR DIVISION

5.1.1. PRODUCTION

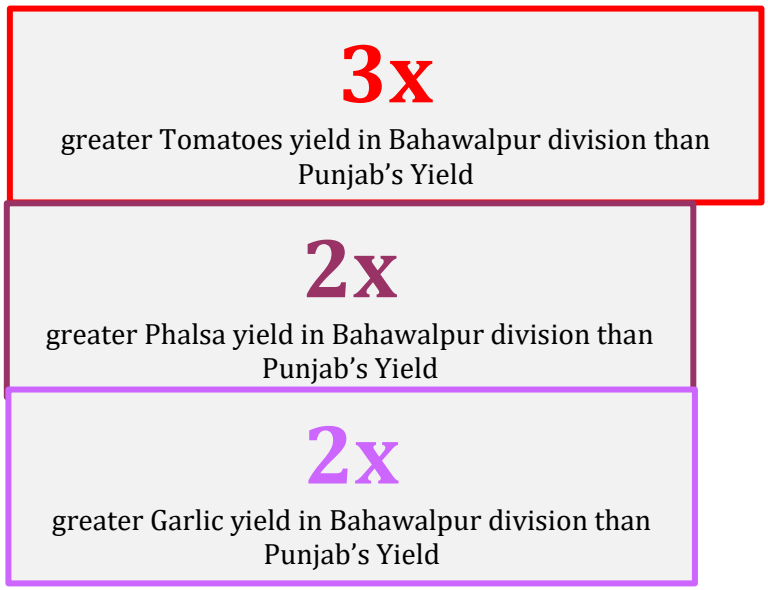
The production of major crops like Cotton, Rapeseed, & Sugarcane shows that 50% of Punjab's Cotton production is from the Bahawalpur division, 29% of Rapeseed, and 28% of Punjab's sugarcane production are from the Bahawalpur Division. Keeping in view the performance of the Bahawalpur division, the government should give a specialized support system and improve technology for the high-value crops so that the overall production is increased with minimal utilization of input factors such as land, water, and labor. Based on the existing pattern of crops, it is visible that the Bahawalpur region is of immense importance and can provide significant production of these crops.



Source: Crop Reporting Service

5.1.2. YIELD

The factors like plough and rotavator, planking, irrigation, seed type & treatment, urea fertilizer, farmyard manure, latest varieties & certified seed, weed spray, diseases, and pests' sprays are found as contributing factors towards higher yield of all crops while the soil type, excessive seed rate, weeds, diseases, and pests attack negatively influence the yield of crops. Despite the unbalanced quantities of input, the yields of crops in the Bahawalpur region show an important contribution as seen below. Tomatoes yield is three times higher than Punjab's yield, and two times higher for Phalsa, and garlic. Thus, the production and yield of the Bahawalpur division show a significant contribution to the agriculture sector.



Source: Crop Reporting Service

5.2 CURRENT CROPPING PATTERN

The current Rabi cropping pattern of the Bahawalpur Division is given in figure 6. The value per acre of crops and the area of each crop are shown in the figure below. It shows that 26 crops are being sown in this season from which wheat and fodder are produced significantly. Wheat is the major crop of this division of Rabi season and is cultivated on 2.5 million acres whereas the total area of this region accounts for 6.5 million acres of land. Also, it is revealed that currently most of the area cultivated is under low-value crops whereas, the area under cultivation of high-value crops is negligible. That is why the Bahawalpur Division is

getting only Rs. 55,000/ acre output in Rabi despite having rich recourses of land, water (ground & surface), and labor in this region.

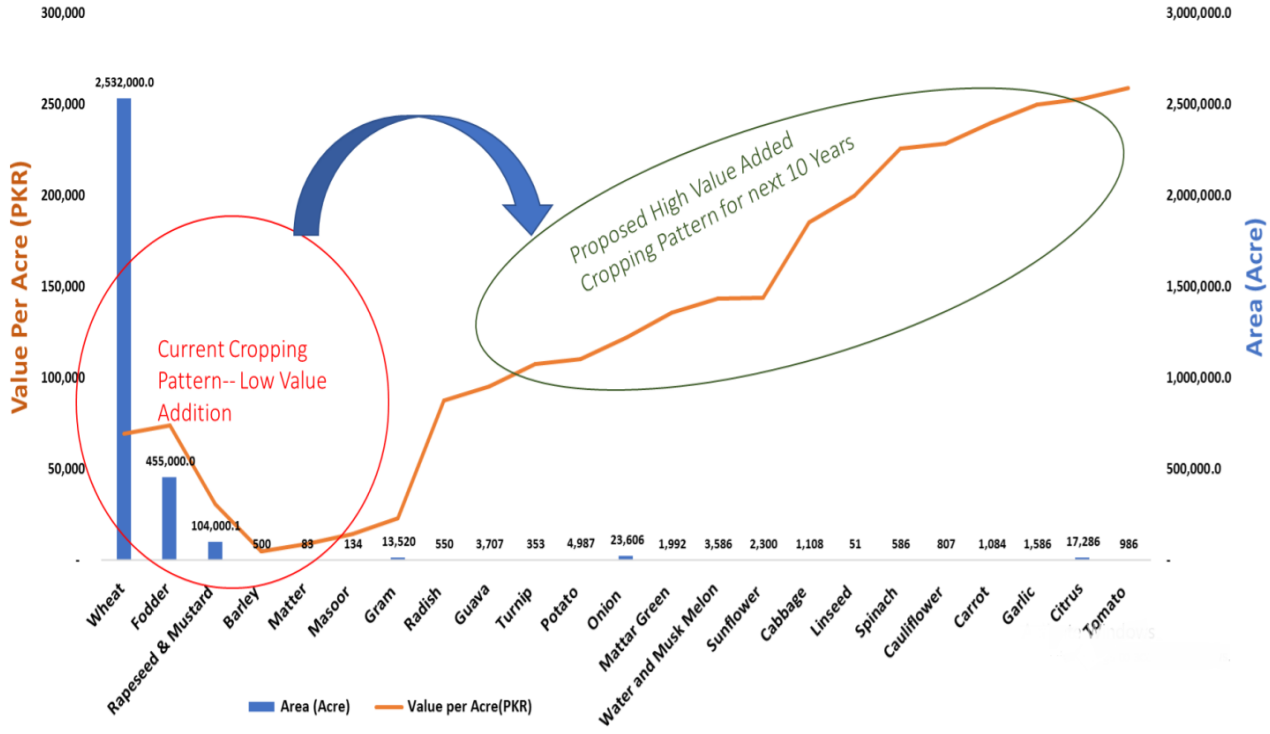


Figure 6: **CURRENT CROPPING PATTERN IN RABI**

Source: Crop Reporting Service

Figure 7 below shows the current Kharif cropping pattern. In this season 31 crops are sown of which Cotton and Sugarcane show a significant contribution. The Bahawalpur Division is getting only Rs. 70,070/ acre output in Kharif season despite having rich recourses of land, water (ground & surface), and labor in this region.

Consequently, the current cropping pattern needs to shift towards high-value crops. This needs to be done in a proper scientific manner by identifying the agroecological condition, the suitable crops of that region,

and the development of the value chain. Although, there is a great agricultural potential available in the division such potential has not been fully identified, and that requires thorough investigations/study. This gap can easily be bridged by plugging in the loophole in the existing supply chain of agriculture products with a specialized support system. It can be achieved by identifying the potentials for diversification in agriculture and identifying the constraints hindering production enhancement and increase in profitability. Therefore, based on agroecological conditions, some of the crops are proposed that will achieve the stipulated goals, effectively.

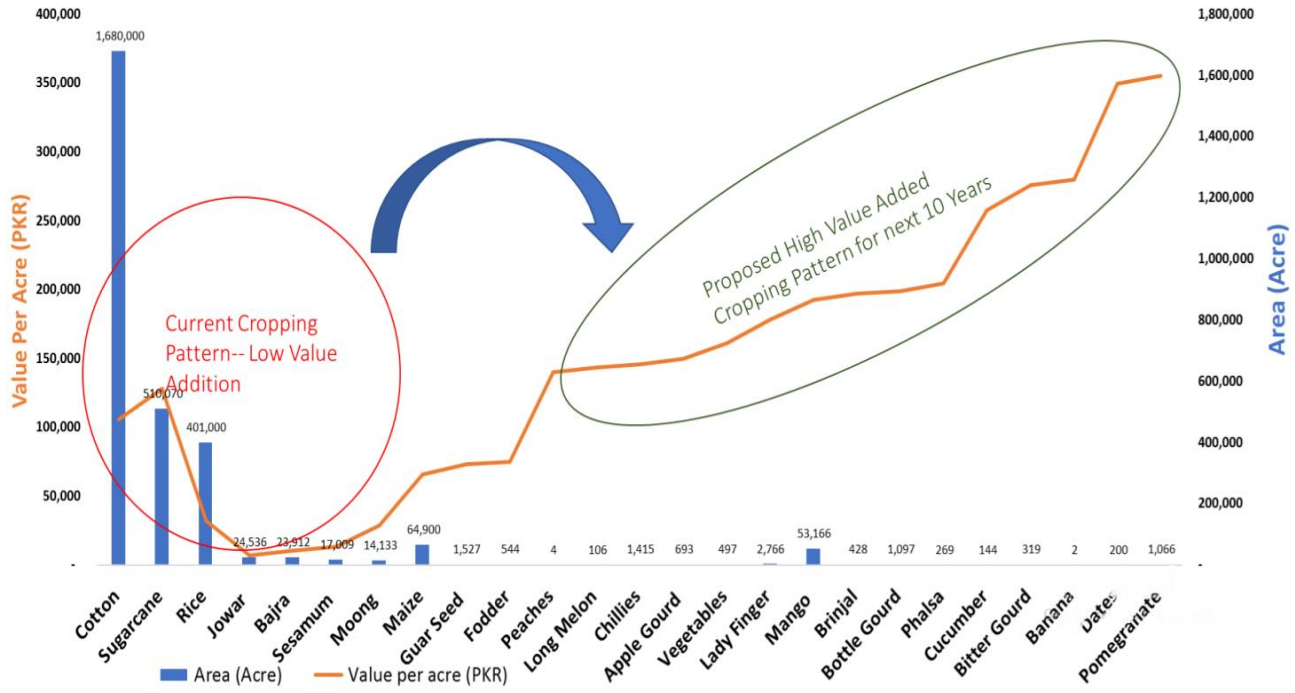


Figure 7: **CURRENT CROPPING PATTERN IN KHARIF**

Source: Crop Reporting Service

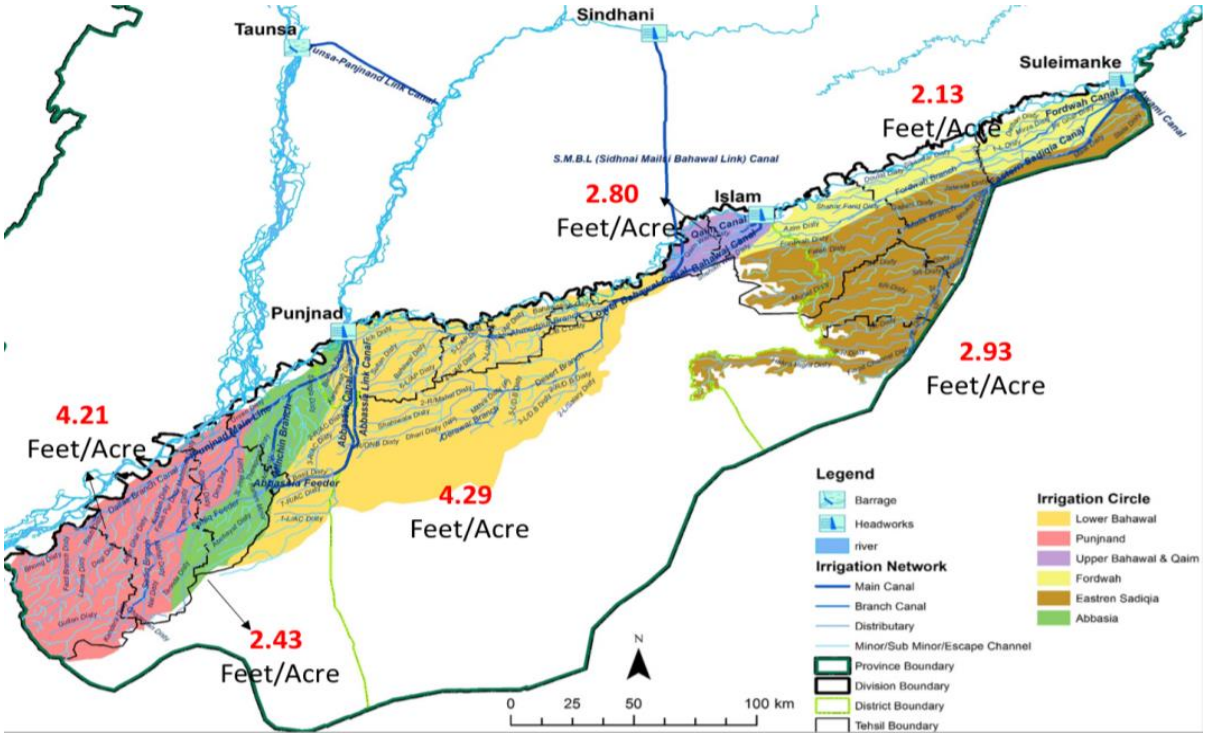
5.3 INEFFICIENT WATER MANAGEMENT & POOR GROUNDWATER SUITABILITY

The Bahawalpur Irrigation Zone consists of six canal circles namely as under:

- Lower Bahawal
- Punjnand
- Upper Bahawal & Qaim
- Fordwah
- Eastren Sadiqia
- Abbasia

The map below describes that the Surface water availability (3.45 feet/acre) is comparatively high as compared to the Punjab average (2.24) but the efficiency is very low due to conveyance & field application losses (Water efficiency is only 54 %). Considering the watercourses, out of 12,952 watercourses, 7,347 (56%) need to be improved to increase conveyance efficiency. Due to this, 40% of farmers (villages at Tail and Mid-Tail) in the division did not receive canal water or get only 50 % of the allocated amount whereas 52% of villages have unfit groundwater for crops.

The total water availability is very low because the canal system is inefficient due to which there is an improper distribution of water. This further elaborates to focus on proposing innovative interventions for maximizing water efficiency. Crops with high yield and low water usage should be preferred. More importantly, it is essential to spatially conserve water to provide irrigation to areas, which require more water. Therefore, water efficiency needs to be further prioritized in the Bahawalpur division to meet international standards.



MAP 1: WATER AVAILABILITY & SUITABILITY

Source: Punjab Irrigation Department

5.4 VILLAGE LOCATION ON THE CANAL

The division village location on canal represents that 40 % of the villages at Tail and Mid & Tail depicts less water availability in comparison to others. Mostly the water unavailability is around the mid and tail canals with the least at the head.

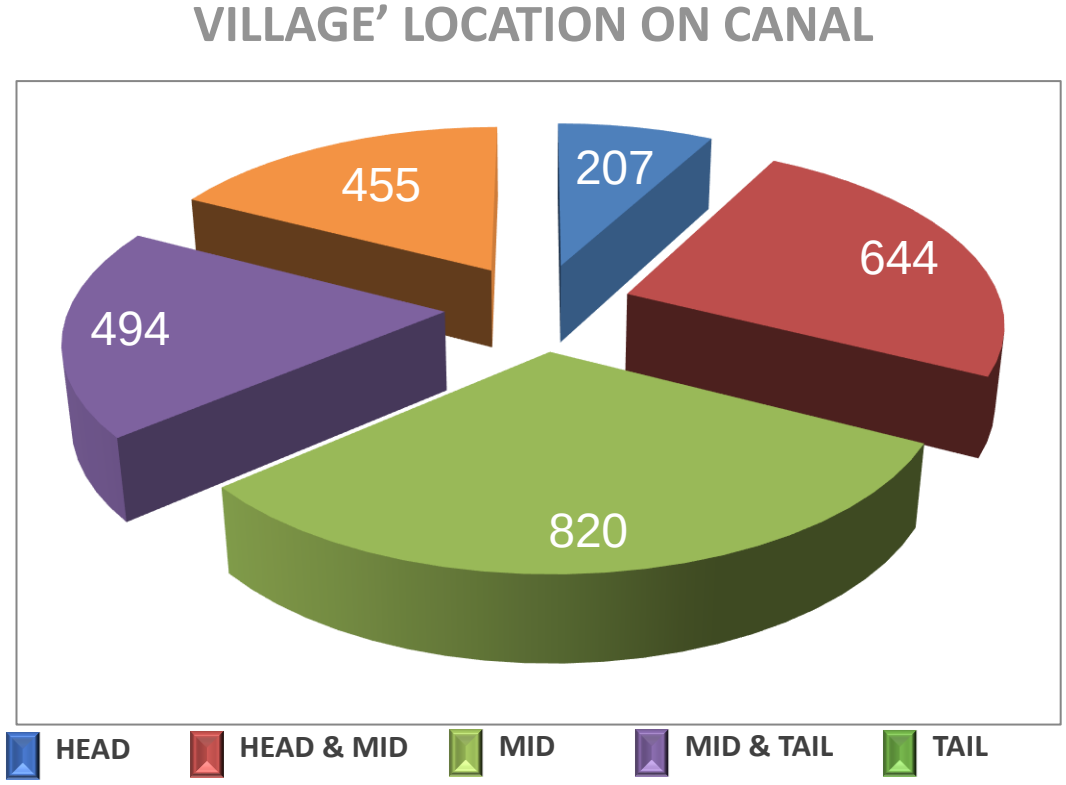


Figure 8: **BWP VILLAGE LOCATION ON THE CANAL**

Source: Urban Unit

5.5 GROUNDWATER SUITABILITY

Groundwater irrigation is more prevalent in areas where canal water availability is less than the irrigation water demand. The estimated groundwater suitability for the crops of the Bahawalpur division shows that 52% of Villages have unfit groundwater. The maximum amount of unsuitability can be seen around the district Bahawalnagar.

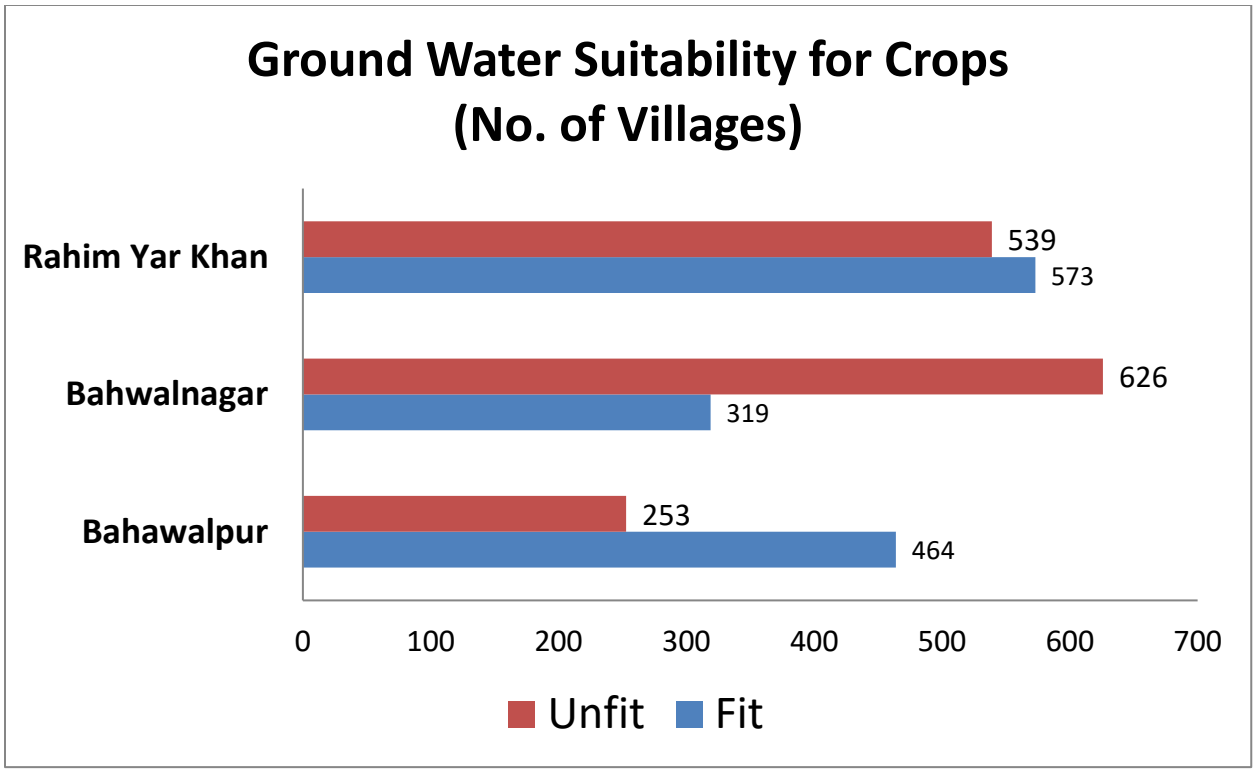


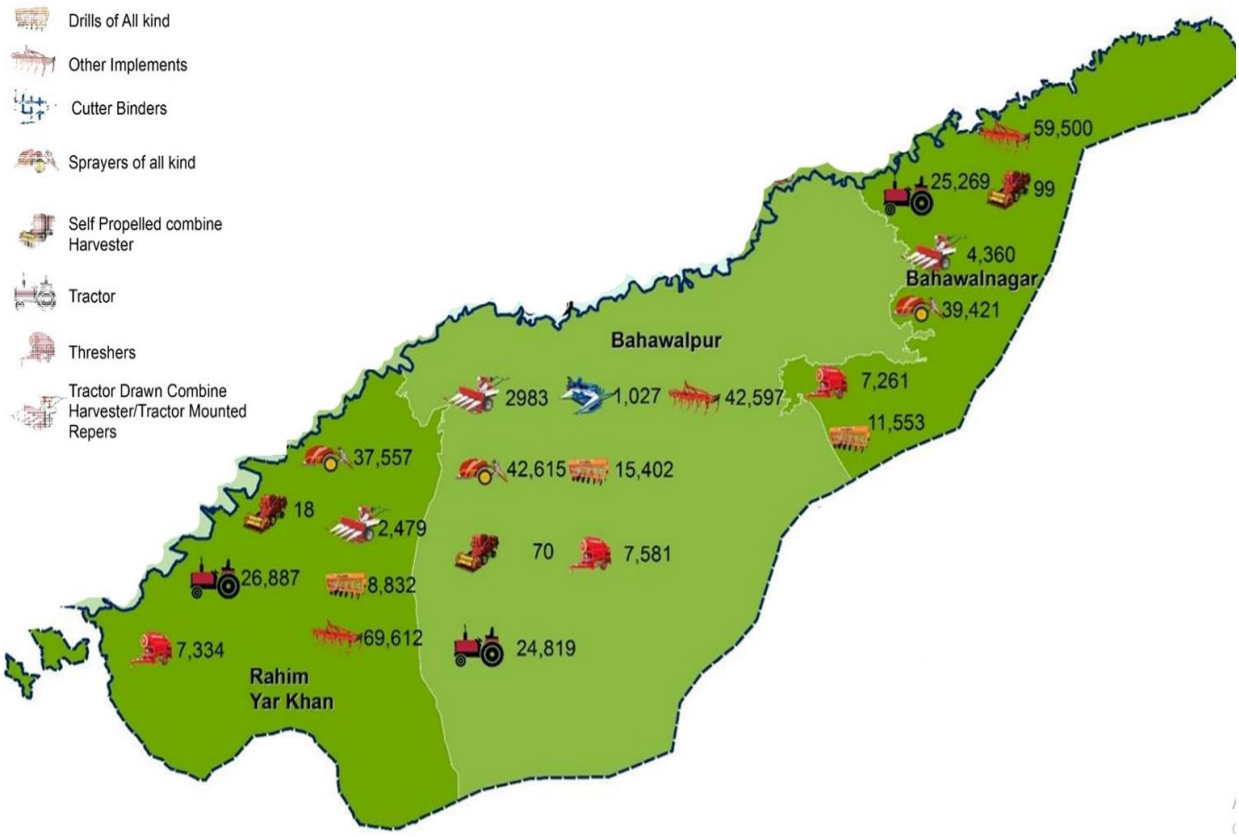
Figure 9: **BWPD GROUNDWATER SUITABILITY**

Source: Urban Unit

5.6 POOR FARM MECHANIZATION

The poor farm mechanization constraints faced in the Bahawalpur region are due to the following main reasons:

- Small and scattered landholding
- Poor farmers, lack of investment
- Farm machinery has a large turning radius
- Lack of knowledge
- Fuel affordability
- Lack of repair and maintenance facilities
- Seasonal nature of agriculture (machinery remain idle)



MAP 2: POOR FARM MECHANIZATION

Source: Punjab Development Statistics (2019)

5.6.1. MECHANIZATION GAP IN PUNJAB

Table 1 elaborates the Mechanization gap in Punjab as compared to Indian Punjab. The existing coverage of implements shows that chisel plow, rotavator, and disc harrow exhibit a very low share in Punjab in comparison with Indian Punjab. Therefore, to remove the mechanization gap in Punjab it is essential to deploy smart tools and service centers in each crop zone to promote Mechanization. This also implies that the extension services are weak, and many farmers are unaware of modern methods including information on agrochemicals, crop varieties, and fertilizer use.

TABLE 1: MECHANIZATIPON GAP IN PUNJAB

Implement	Applicability	Punjab (Per 10,000 acres)	Indian Punjab (Per 10,000 acres)	Existing Coverage As % of Indian Punjab
Tractors	All Crops	140	295	47%
Chisel Plow	Cotton Sugarcane	2	28	8%
Cultivator	All Crops	102	224	46%
Disc Harrow	All Crops	5	118	4%
Rotavator	All Crops	14	155	9%
Seed Drill	Wheat	21	124	17%
Ridgercum Fertilizer	Sugarcane Cotton	22	56	38%

Source: Punjab Development Statistics (2019)

5.6.2. AVAILABILITY OF MACHINERY

Table 2 illustrates the availability of agriculture machinery. It can be seen that twenty-four farmers are provided with single machinery i.e. a thresher and it would cover 179 acres of land. This indicates the amount of machinery the specified number of farmers are getting in Punjab. In addition, the effects of mechanization had always been overall positive. Since farm mechanization not only increased the income and labor productivity at the farm, but also generates off-farm employment in manufacturing, supply/maintenance of agricultural machinery, and post-harvest operations of agricultural produce.

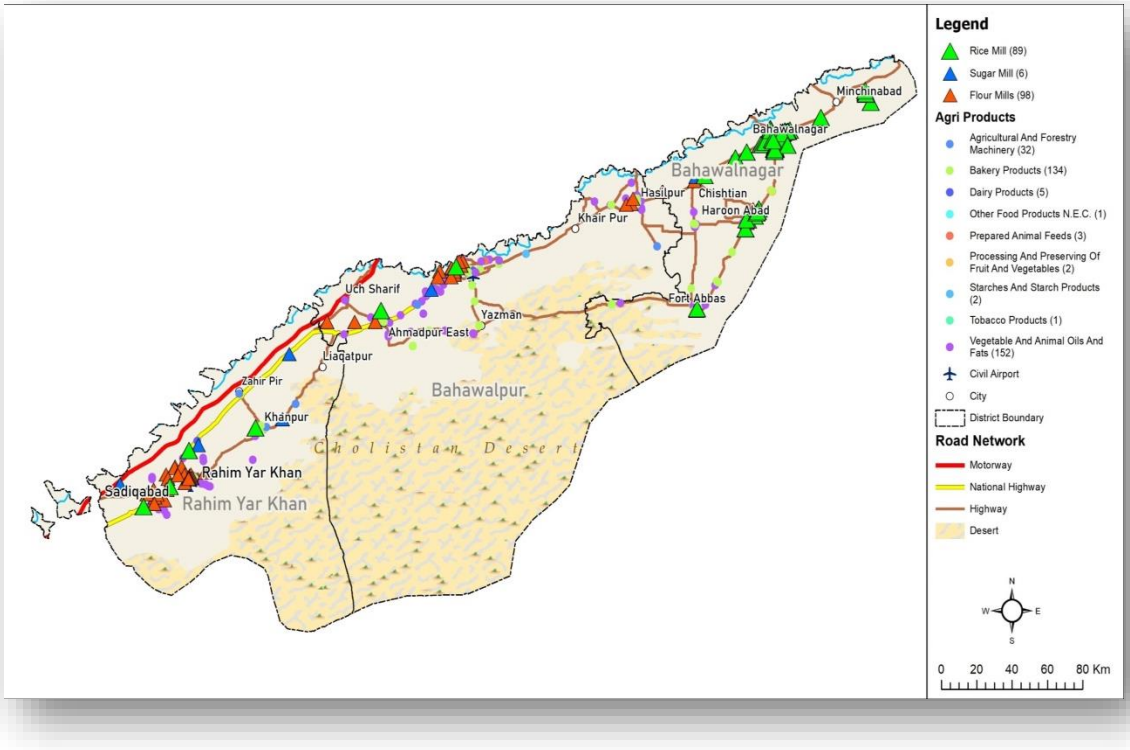
TABLE 2: AVAILABILITY OF MACHINERY

Agriculture Machinery	(Farmers/Machine)	Acres / Machine
Threshers	24	179
Self Propelled Combine Harvester	2,384	17,610
Tractor Mounted Reapers/Harvester	55	403
Cutter Binders	555	4,098
Sprayers of all Kind	4	32
Drills of all Kind	16	115
Other Implements	3	23
Tractor	7	51

Source: Punjab Development Statistics (2019)

5.7 LOW-VALUE ADDITION & EXISTENCE OF TRADITIONAL AGRO-BASED INDUSTRY

Map 3 shows the spatial distribution of rice, sugar, and flour mills in the Bahawalpur region. Low-value addition in agriculture produce especially in High-Value Crops is seen in this region. Also, the industrial units are not located in the potential crop zones. While Cotton is the main crop of the Bahawalnagar district (20% of the total province cotton production), but only 0.01% Ginning industry of Punjab is in this district. Moreover, there are very few spinning mills in the entire division. In addition, there is no processing industry for HVC and spinning mills in the entire division.

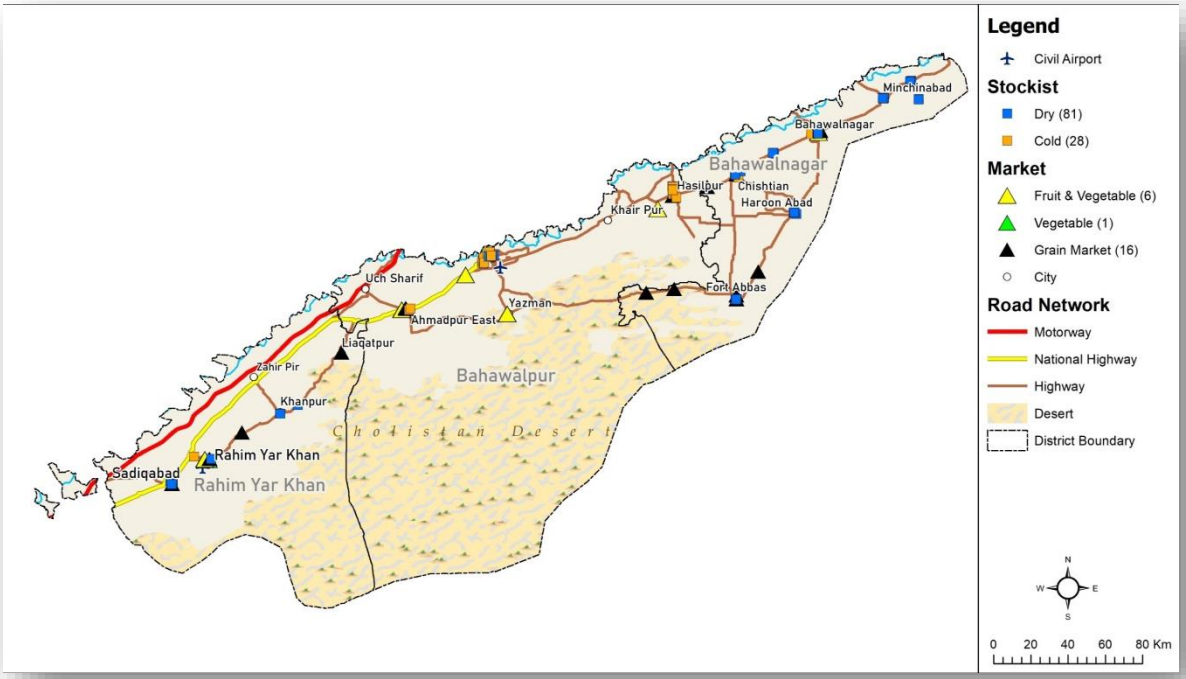


MAP 3: AGRO-INDUSTRY IN BAHAWALPUR DIVISION

Source: CMI

5.8 INEFFICIENT AGRICULTURAL MARKETS

Map 4 shows the inefficient markets in the Bahawalpur region. The majority of the markets are located in isolation and are not within reach of the farmers. Also, a huge number of fruits and vegetable markets are not functional in various tehsils of the Bahawalpur division. Due to which the role of the Middle man has reduced the profit margin of the farmer, as shown in table 3:



MAP 4: FOOD & VEGETABLE MARKETS

Source: Urban Unit

Table 3 shows that there is no proper storage capacity in markets and the existing storage capacity is costly. The commodity prices are shown below as an example to show the inefficient market behavior in the Bahawalpur region.

TABLE 3: FOOD AND VEGETABLE MARKETS

Commodity	Farmgate Price (PKR/kg)	Wholesale Market (PKR/kg)	Retail Price (PKR/kg)
Mutton (Goat Meat)	**250**	**800**	**1200**
Lady Finger	**6**	**30**	**70**

SOURCE: URBAN UNIT

5.9 LIVESTOCK

The socio-economic significance of the livestock sector in Pakistan cannot be ignored. In the domestic scenario, the livestock sector is significantly interlinked with the dairy sector, i.e. meat and other livestock products are essentially considered to be by-products of the dairy sector in Pakistan. It is therefore imperative to understand that the uplift of the livestock sector is largely dependent on the pace of development undertaken in the dairy sector. The livestock sector not only supports the agriculture sector but also the processing industry and services sectors in terms of meat and dairy processing, leather, tanneries, and wholesale and retail sub-sectors.

5.9.1. LIVESTOCK PROFILE IN BAHAWALPUR DIVISION

Bahawalpur Division is endowed with a large livestock population well-adapted to the local environmental conditions. It includes the best dairy breeds of buffalo cattle. Many breeds like cattle, buffaloes, sheep, and goats have good meat production potential. The share of livestock in Punjab is given below. The total estimated Livestock Population in Punjab (Million) comes out to be 58.33 while the Livestock Population in Bahawalpur Division (Million) is 9 (15% of Punjab). Potential Breeds are identified in the Bahawalpur Division with the maximum share of goats in Punjab (19%) and the least share of camels is 13%.

The total economic losses due to different contagious diseases are immense. For instance, FMD is a serious threat to livestock causing 6 Billion US$ in Milk production and more than 8 Billion US$ in Total annually. Considering these problems associated with Livestock production, interventions are devised to incur a boost in production and minimize the losses with efficient potential breed production.

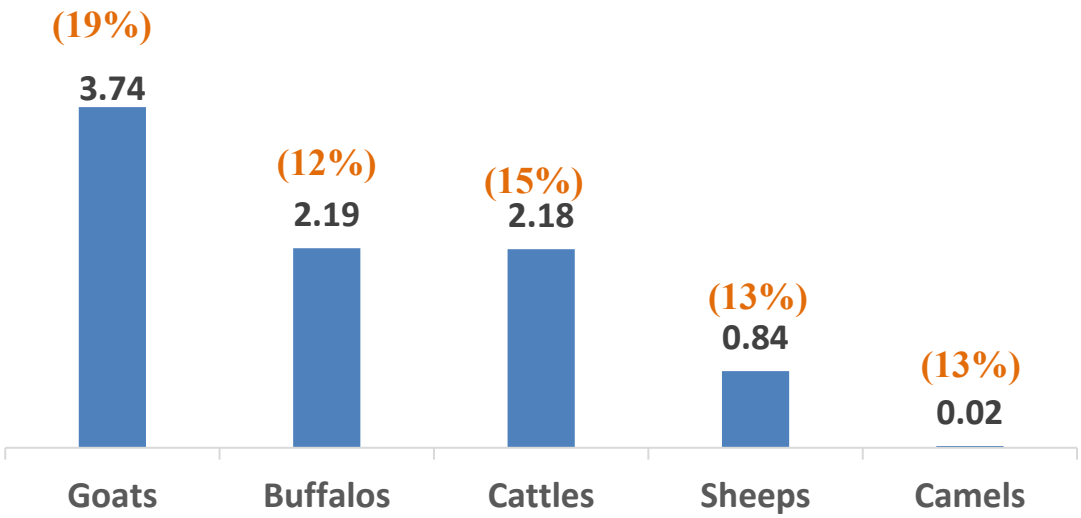


Figure 10: **LIVESTOCK SHARE IN PUNJAB**

Source: Pakistan Livestock Census 2006

5.9.2. MARKET INEFFICIENCY

The price volatility of goat meat is shown in the figure below. This reflects the market inefficiency. The retail rate of the Bahawalpur division is 900 goat meat per kg which is more than the wholesale rate of 600 goat meat per kg. However, the farm gate price of the cholistan is too low that is 250 goat meat per kg. The below figures indicate that the market behavior reflects high price volatility in the region. As a result, it requires some serious consideration for stabilization and to increase market capacity.

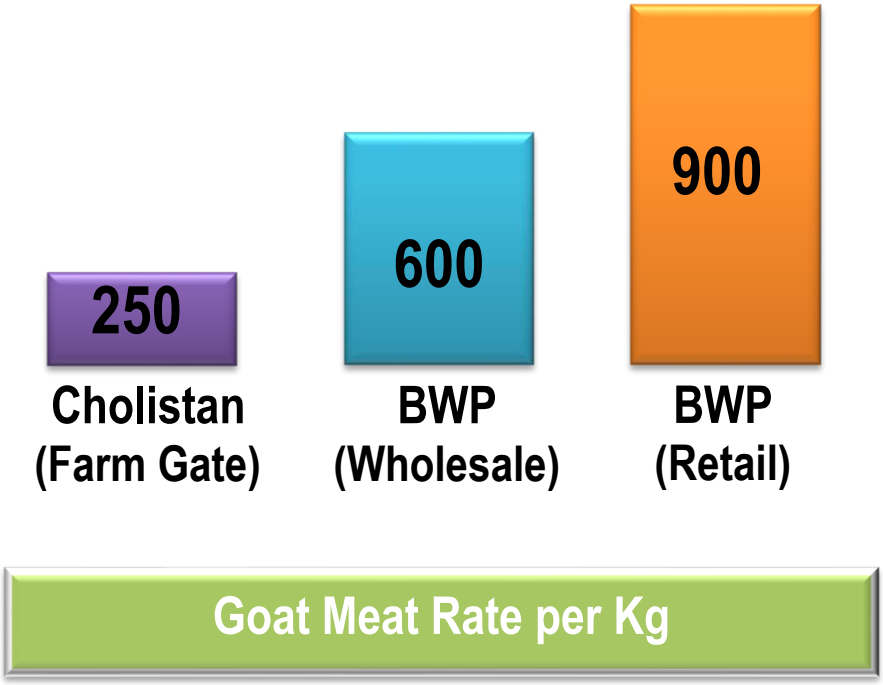


Figure 11: **PRICE VOLATILITY OF GOAT MEAT**

Source: AMIS

5.9.3. LIVESTOCK FACILITIES

Provision of livestock facilities to the poor farmers has to be the core objective. This objective targets the gap identified in the Bahawalpur division regarding the facilities like delayed procurement of vaccine, non conducting of field survey to identify the epidemic diseases, non-provision of semen of improved breed, unseasonal vaccination of livestock, non-provision of training/orientation to the field staff, lack of proper monitoring, evaluation and feedback, and lack of AI services along with treatment facilities to treat reproductive disorders of the livestock.

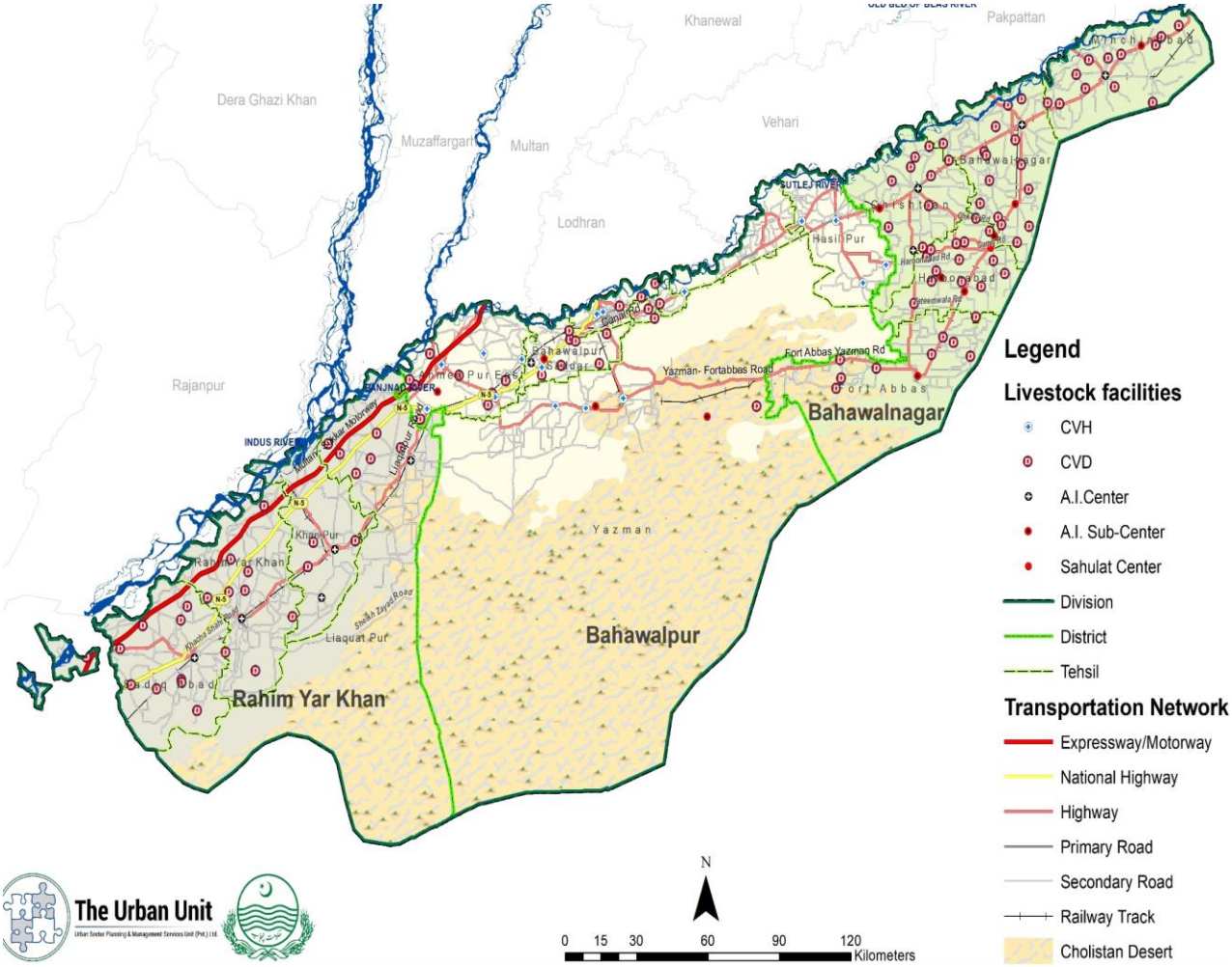
During the visit, the team identified that the record of vaccine, de-wormer, and medicine issued to the breeder was limited up to daily treatment registers. Non-maintaining of beneficiary-wise records resulted in the non-achievement of targets. As a result, the current situation reflects that small farmers are mostly unable to adopt modern methods of animal rearing due to their poor economic conditions and the high cost of technology. They are also unable to provide proper housing and shelter for the various types of livestock,

such as sheds and paddocks. Concerns include a lack of purpose-built farms, as well as a lack of access to water and feed resources.

However, the total number of veterinary facilities for the Bahawalpur division are mapped below:

- Seventeen Civil Veterinary Hospitals (CVH)
- One hundred and seventy Civil Veterinary Dispensaries (CVD)
- Fifteen Artificial Insemination Centers (AIC)
- Twenty Artificial Insemination Sub Centers
- And Sixteen Sahulet centers (SC)

The urban unit has identified the livestock facilities and transportation networks that have been established in each district of the Bahawalpur division. Later on, multiple projects are devised that could take over the operations of the existing cattle markets and improve facilities and livestock trading environment in the entire division.



MAP 5: LIVESTOCK FACILITIES

Source: Urban Unit

5.9.4. POTENTIAL LIVESTOCK BREEDS

The potential livestock breeds have been identified for the Bahawalpur division as given in the table below. The specified breeds are adapted based on the local conditions of the region. For instance, Cattle were originally kept for draught purposes but, with mechanization gaining momentum, cattle are being kept for dairy and meat purposes. Despite having a good potential of breeds, productivity and value addition issues for meat and milk have been observed. The productivity of the livestock sector in the Bahawalpur region is low compared with international markets, in terms of meat and milk output. However, the productivity increase in livestock can have a significant impact on total income in the sector as well as exports.

Livestock breeds identified in the Bahawalpur division would have a substantial scope in increasing the export of high-value livestock and dairy value-added products.

TABLE 4: LIVESTOCK BREEDS

Sr. No	Animal	Potential Breed	
1.	Buffalo	Nili / ravi Kundhi Azakhale	
2.	Cattle	Sahiwal Foreign / cross breed Thari Cholistani	
3	Sheep	Lohi Buchi Kajli Thalli	
4	Goat	Teddy Beetal Barbery Damani	

SOURCE: PAKISTAN LIVESTOCK CENSUS 2006

5.10 AGRO-ECOLOGICAL CONDITIONS

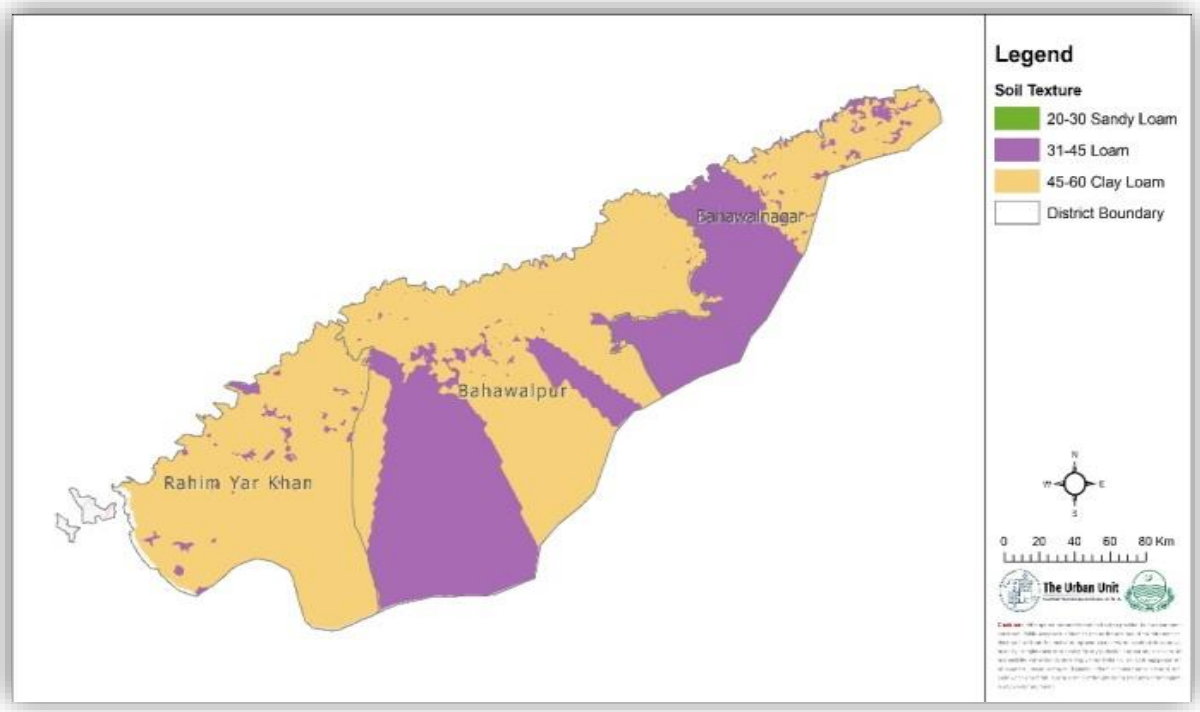
Climate is a prime factor that exerts a major influence on vegetation, soil health, and water resources. Changing climate is likely to elevate the vulnerability of agricultural systems (Rosenzweig et al., 2013) by increasing temperature, changes in rainfall patterns, and more frequent extreme weather events in the world (IPCC, 2014). There is an explicit change in the weather patterns in Pakistan (Ahmad et al., 2015). Subsequently, climate change and variability have impacted crop production and could also be the reason for the shift in cropping systems in some districts of the Bahawalpur division.

Consequently, the urban unit has identified different Agro-ecological zones in the Bahawalpur division based on Agro-climatic and Edaphic variables through which crop zoning have been identified;

- Identified suitability of crops in AEZs for sustainability.
- Assessment of Agro-economic performance in delineated agro-ecological zones.

The soil is a key element of agriculture, without which we could not grow plants. Each type of soil is not suitable for each crop due to the effect of different crop growth factors. Soil conditions and characteristics are one of the key factors that directly drive crop growth potential and thus, a soil data set is key information when developing agro-ecological zones.

The texture is the most important parameter of soil. There are three different soil textures reflected in map 6 below i.e. Sandy Loam, Loam, and clay loam which is the dominant soil in this region. Redefining AEZs was based on the moisture index calculated by using ET0 with an overlay of analysis of soil texture.



MAP 6: SOIL TEXTURE OF BAHAWALPUR

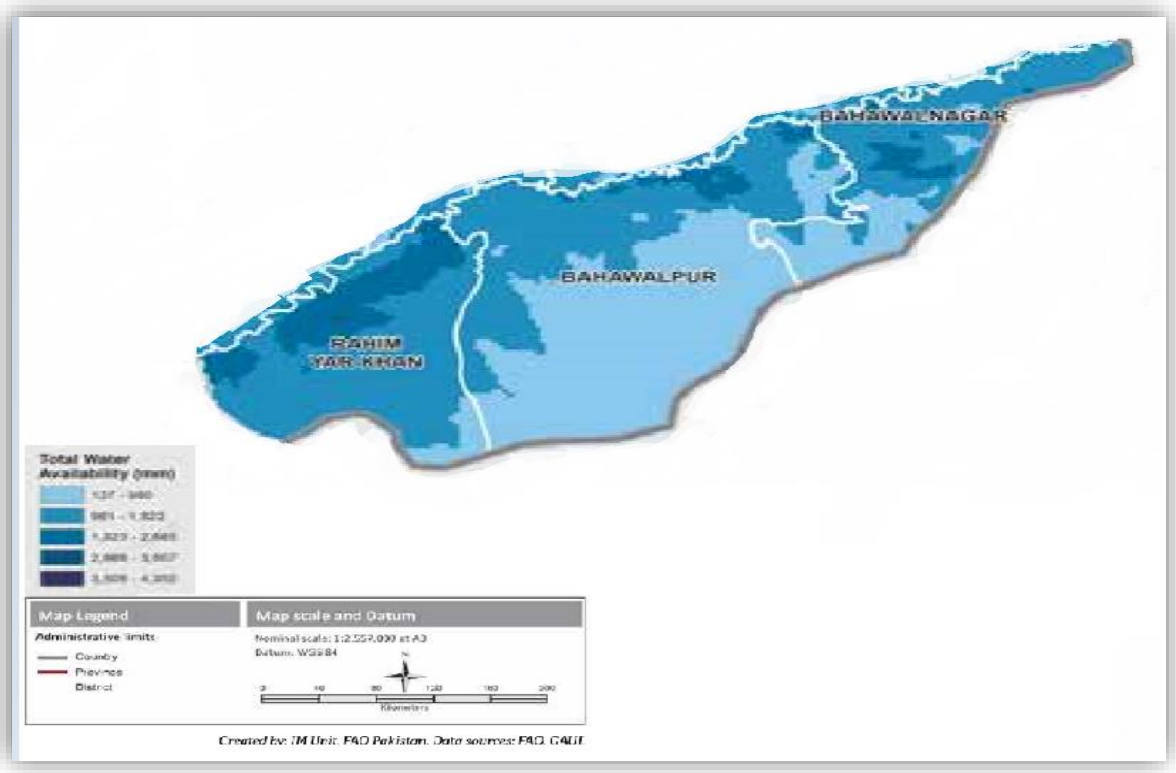
Source: Urban Unit

Higher organic matter reflects the higher crops yield. The map below demonstrates that most soil in the Bahawalpur region has poor organic matter. The problem with low organic matter in the Bahawalpur division is that the temperature in summer exceeds 45 °C, which increases the rate of decomposition. Furthermore, traditional farmers do not use farmyard manure and remove crops completely (grain plus

straw) from soils, leaving them fallow. Green manuring is also not a trend that has been observed. Therefore, it has been discovered that soils in these areas are lacking in organic matter.

MAP 7: SOIL ORGANIC MATTER (OM)
Source: Urban Unit

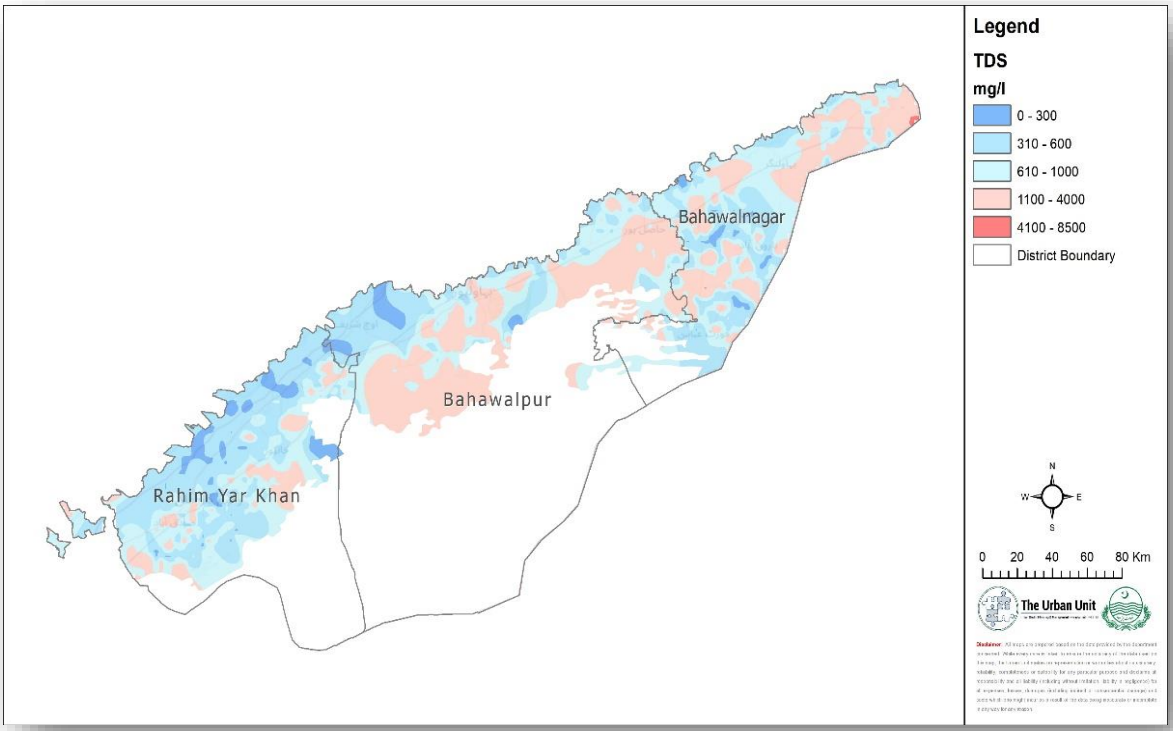
Total water availability is the sum of all sources of water available at the field from the surface water supply, groundwater abstraction, and rainfall. Spatial information of all the resources of water was added for the estimation of the total water available at the field level. Thus, the maximum water availability in the irrigated area was 4500 mm, the highest in this region as compared to other areas of Punjab, and the higher contribution from the groundwater due to the freshwater availability. The maximum total water availability in barani area is 1634 mm.



MAP 8: TOTAL WATER AVAILABILITY

Source: FAO Agroecological Zone (2019)

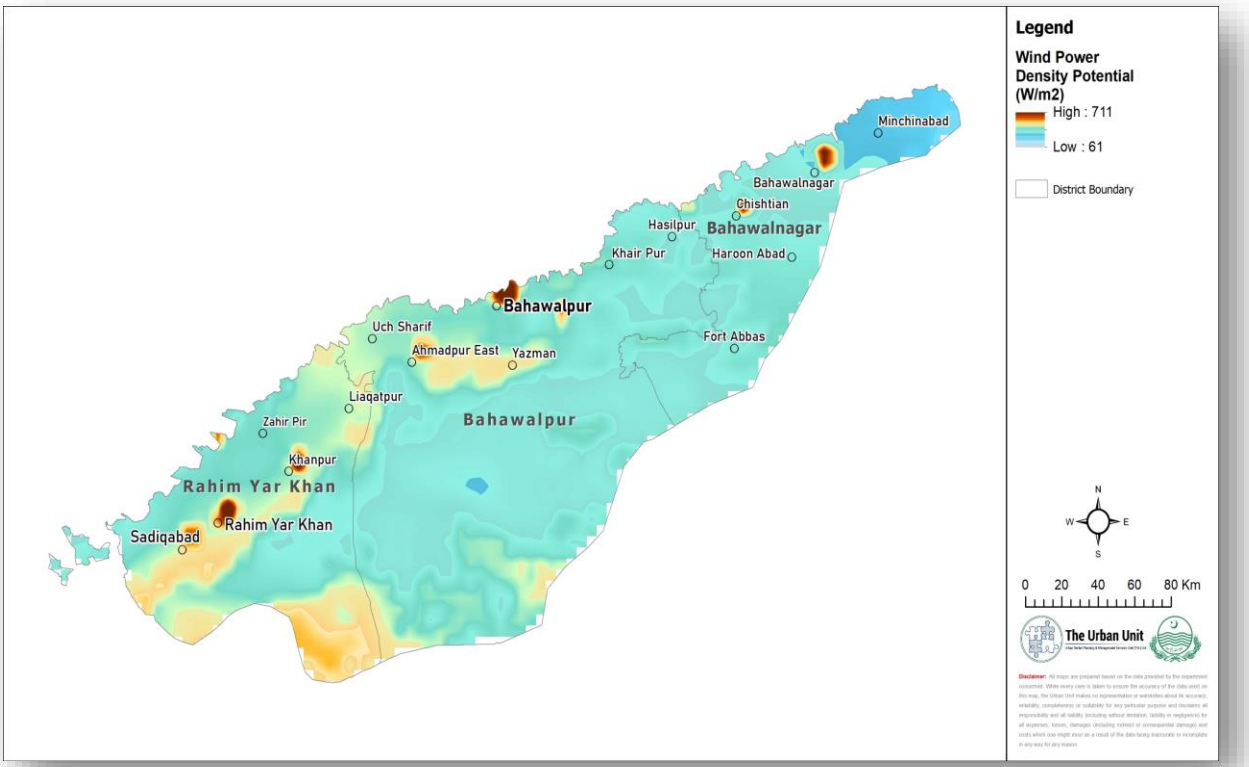
Groundwater not only supplies additional water to fulfill irrigation deficits but also provides flexibility to match crop water requirements. The groundwater of acceptable quality has the potential to provide the flexibility of water supply in canal commanded areas and to extend irrigation to rain-fed areas. It is estimated that up to 95% of all surface and groundwater is utilized for irrigation. Access to groundwater would assist farmers in dealing with the inconsistencies of surface supplies, diversifying cropping patterns, and converting uncertain crop yields into more sustained crop production. Since groundwater quality plays a crucial role in successful crop production, therefore groundwater quality map given below shows that most of the areas in the division are not suitable for crops.



MAP 9: GROUNDWATER (TDS)
Source: Urban Unit

The spatial distribution of weather station data points is used in this study. The weather stations used for the collection of weather data include wind power, Average yearly temperature, and solar irradiance.

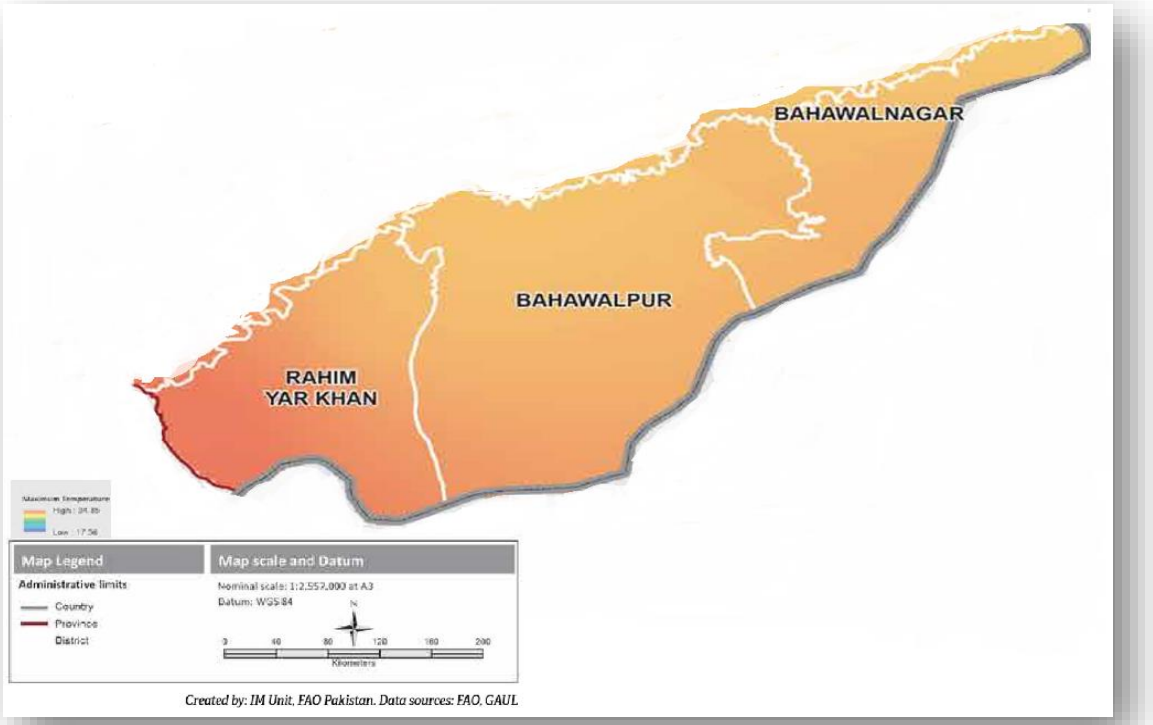
Map 10 shows the wind power density potential (W/m2) observed for the Bahawalpur region ranging from high 711 to low 61 density potential. A smaller portion of all three districts of the Bahawalpur region falls under the high-density wind power areas.



MAP 10: WIND POWER

Source: Urban Unit

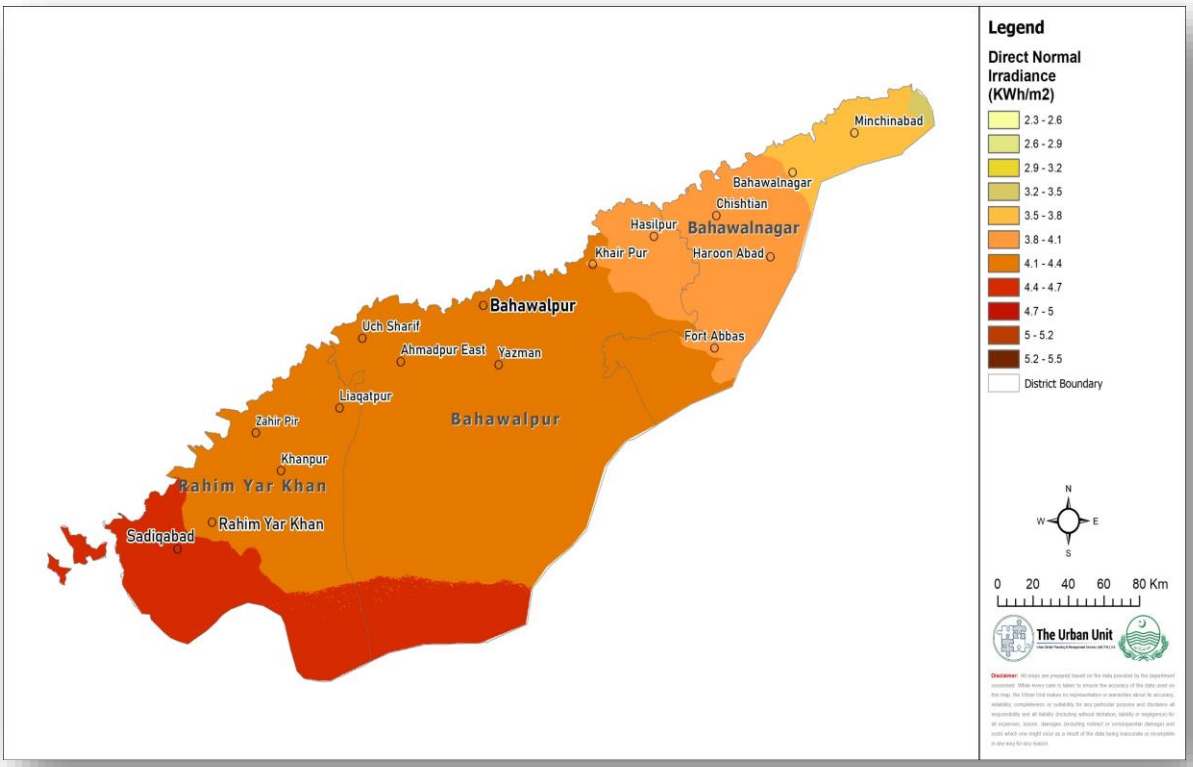
The yearly average temperature has been observed in the Bahawalpur region shown below. The average maximum-maximum temperature observed in Rahim Yar Khan shows up to 32.9 0C. In agro-climatic suitability, attributes of temperature regimes to crop requirements for photosynthesis and phenology are used to determine which crops qualify for further consideration in the evaluation.



MAP 11: YEARLY AVERAGE TEMPERATURE

Source: FAO Agroecological Zone (2019)

The strength received from the Sun in the form of electromagnetic waves as evaluated in the range of wavelength of the measurement device is referred to as solar irradiance. Direct Normal Irradiance (KWh/m2) is computed for the Bahawalpur region with maximum solar irradiance observed in the lower Rahim Yar Khan and Bahawalpur districts.



MAP 12: SOLAR IRRADIANCE

Source: Urban Unit

Hence, based on the above agro-ecological conditions, the Bahawalpur division is summarized on the following agro-climatic factors:

TABLE 5: AGRO-CLIMATIC FACTORS

Avg, rabi max temp (^{0}C)	Avg, rabi min temp (^{0}C)	Avg, kharif max temp (^{0}C)	Avg, kharif min temp (^{0}C)	Rainfall (mm)	ETo (mm)	Soil type	EC
28.09	12.31	39.28	27.31	230	3.20	Most Sandy	0.07-27
29.20	12.45	40.41	27.59	234	3.10	Loam, sandy loam (9%)	0.07-27
27.59	12.38	38.94	27.22	412	2.88	Loam, sandy loam (20%), clay loam (8%)	1-27

SOURCE: FAO AGROECOLOGICAL CONDITION

Based on the above-described conditions, the following crops have been identified as suitable for the Bahawalpur division; chilies, cucumber, garlic, ladyfinger, onion, tomato, falsa, mango, watermelon, musk melon, grapes, pomegranate, ber, sunflower, sugarcane, citrus, and cotton. In this regard, production, yield & value, and logistics analysis of the Bahawalpur division are discussed below.

5.11 PRODUCTION ANALYSIS

Potential agriculture crops zone based on these agroecological conditions is shown in the map (figure 12). These zones are identified based on comparative advantages in yield, production, and agroecological conditions.

For example, Tehsil Rahim yar khan and Sadiqabad are chosen for the mango crop from Rahim Yar Khan District. The total Mango production in Punjab is 1.3 million tonnes out of which 15% are produced in the Rahim Yar Khan district. Tehsil Rahim Yar Khan and Sadiqabad are producing 80 to 90 % of the total

produce of the Bahawalpur Division. Therefore, we have selected these Tehsils for the mango cluster. Currently, a minimal area of Rahim Yar Khan and Sadiqabad is dedicated to the production of mango which needs to be increased to 40-50% of the total cultivated area so that the best quality mango is produced in greater quantities. Likewise, we have identified specific high-yielding locations for each crop as shown in the map along with potential clusters for each crop clearly showing the current cultivated areas vs. the increased area that needs to be cultivated for certain crop/cluster where a specialized support system is to be provided.

5.11.1 PRODUCTION AREA MAPPING

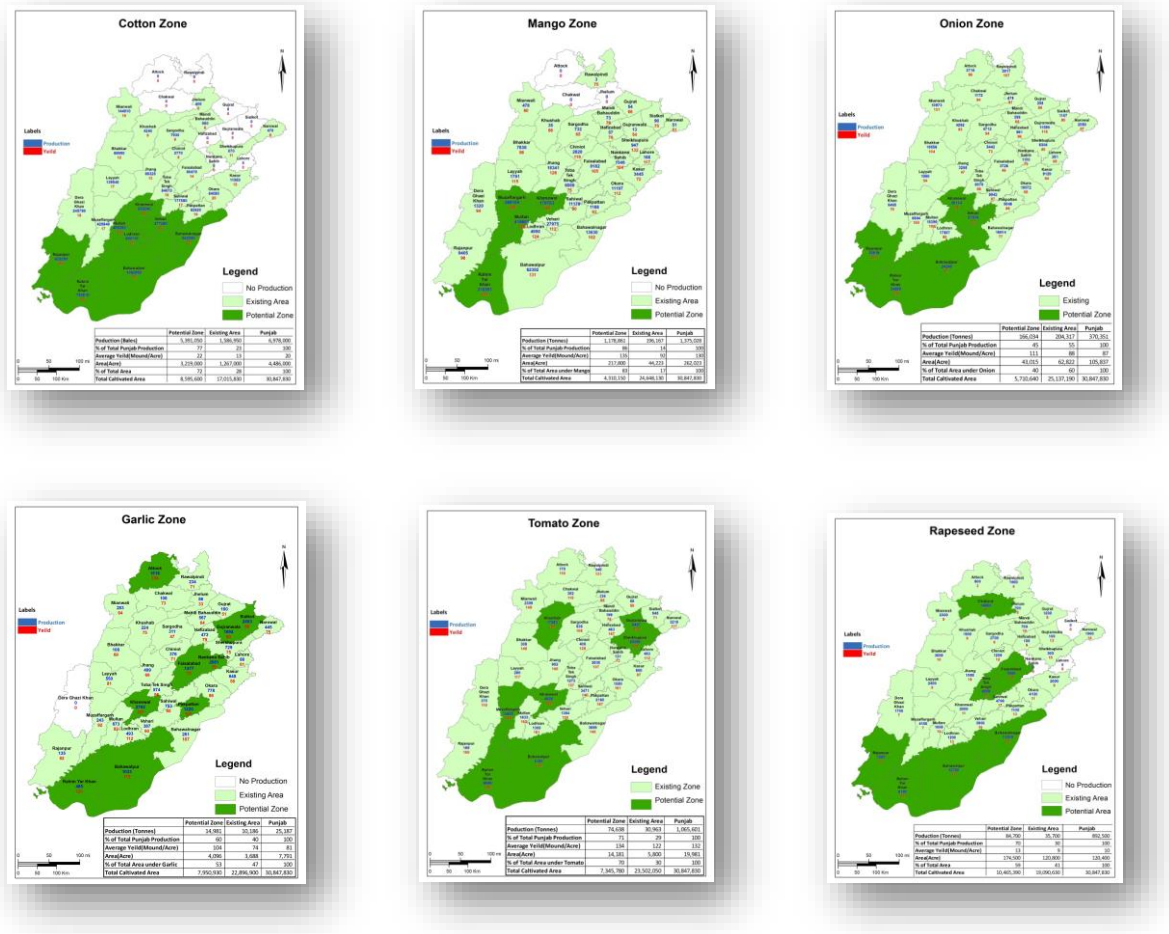


Figure 12: **PRODUCTION AREA MAPPING**

Source: Urban Unit

6. WAY FORWARD FOR AGRICULTURE AND LIVESTOCK SECTOR

The agriculture sector has a strong linkage with food security and the growth of other sectors of the economy. The present situation of the Bahawalpur region needs a high priority to the growth of the agriculture sector on a sustainable basis and requires the implementation of the most appropriate interventions to achieve the desired outcome. The Bahawalpur Rabi/Kharif patterns for the growth of agriculture will further need improvement in its output and capacity-building training to trickle down to farmers. The emphasis is on the use of the better quality seed, and modern technologies to ameliorate agriculture outlook and food security.

The overall goal of the livestock sector strategy for the Bahawalpur region is to contribute towards poverty alleviation and economic development of the province Punjab through the provision of an enabling environment and support services for enhancing value addition, value chain development, enhancing exports, and profitability of the livestock sector.

Livestock is an integral part of the agricultural system in Pakistan. However, with innovative approaches, livestock financial instruments need to be developed to route the finances of milk producers via the middlemen. In addition, agroforestry can also be included in future research studies and reports.

7. PROPOSED CROPPING PATTERN

Based on agro-ecological conditions, production, yield & value, and logistics analysis mentioned above, 22 crops are recommended out of 67 crops for this region. Following value chains of the recommended crops in this region are proposed that are discussed below.

Figure 13 & 14 shows the spatial location of Rabi and Kharif crops for the Bahawalpur division.

For Rabi season Wheat, Citrus, Onion, Sunflower, Tomato, Ber, Garlic, Rapeseed, and Grapes whereas Sugarcane, Jowar, Mango, Maize, Musk Melon and Water Melon, Lady Finger, Chillies, Dates, Cucumber, Pomegranate, Falsa, and Olives are proposed for Kharif season. Specific clusters for each crop are identified as shown on the map, where 70 to 80 % of the total production of these crops in the Bahawalpur division is currently being produced. There is a need to increase the area of each crop in the specified cluster as calculated in the map and provide a specialized support system from seed to the international market in each cluster. It will ensure efficient use of resources and increase each crop yield & water efficiency and adoption of good agriculture practices as per international standards.

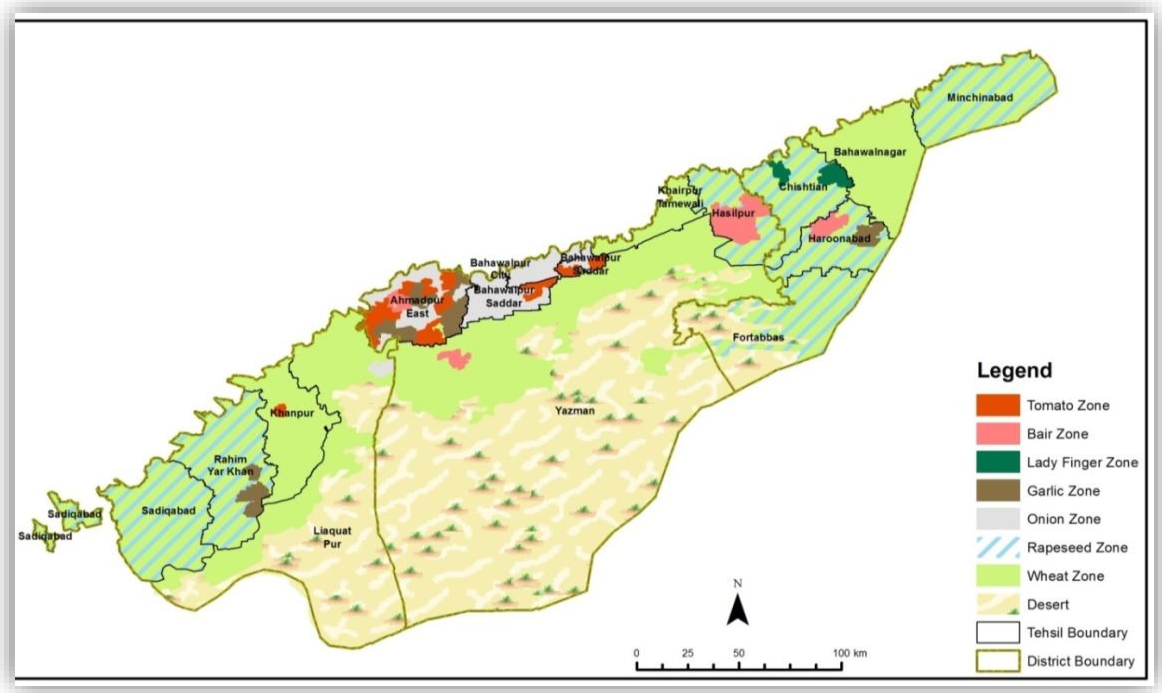


Figure 13: **PROPOSED CROPPING PATTERN OF RABI**

Source: Urban Unit

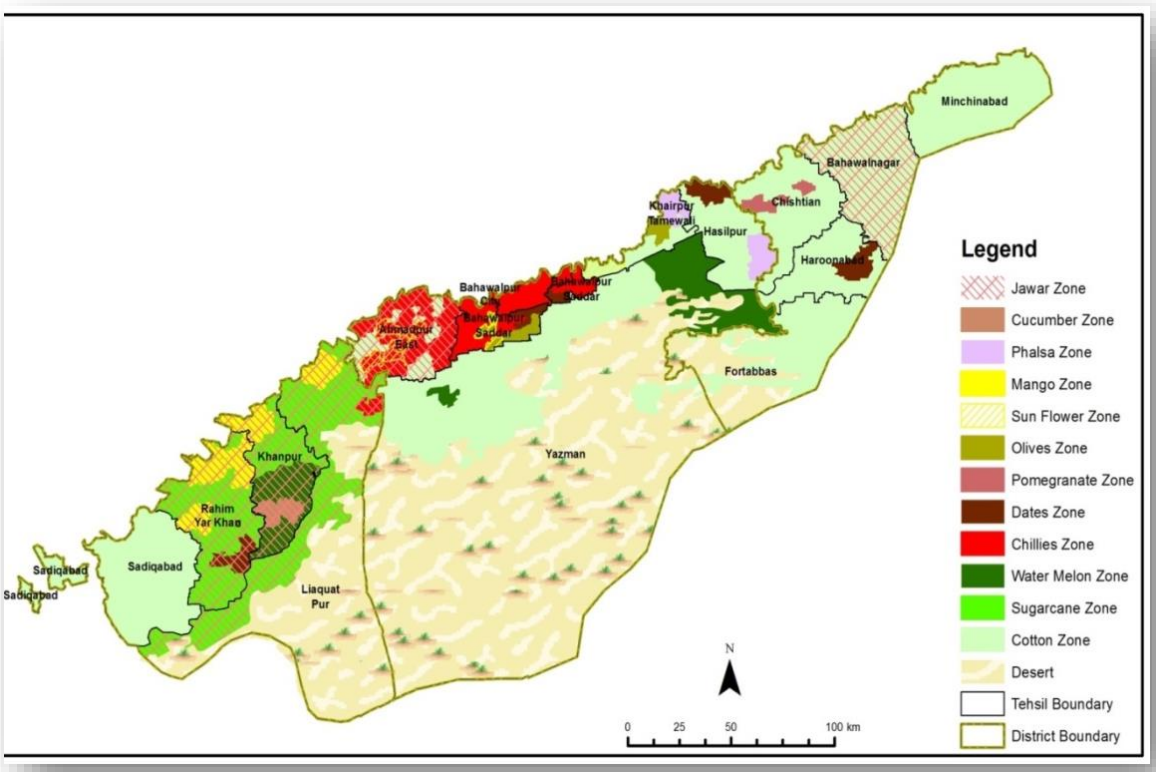


Figure 14: **PROPOSED CROPPING PATTERN OF KHARIF**

Source: Urban Unit

8. IMPACT OF PROPOSED CROPPING PATTERN

The impact of the proposed cropping pattern discusses that the main focus of this plan is on the value chain development through crop zoning.

Considering the analysis highlighted above, the main target is to increase the crop yield of division at least up to the level of progressive farmers, to gain surplus, increase exports and create sustainable value addition.

The below table demonstrates the potential of various proposed crops. Thus, if we achieve a yield of the progressive farmer, better quality, and proper market strategy then we can increase the Bahawalpur agriculture GDP from Rs. 533 Billion to Rs. 1511 Billion.

However, more efforts are required to increase the yield of Wheat, cotton, and sugarcane. Whereas, high-value crops like citrus, mango, dates, and vegetables have the potential. Therefore, sincere interventions are needed to increase their area, and a provision of specialized support systems is also necessary to develop the value chain of these proposed crops.

TABLE 6: IMPACT OF PROPOSED CROPPING PATTERN

Crops	Current Area	Proposed Area	Current Yield Mnd/acre	Potential Yield Mnd/acre	Current Value(PKR)	Potential Value Pkr
Wheat	2,532,000	2,532,000	36	70	176,816,250,000	345,618,000,000
Cotton	1,680,000	1,764,000	18	40	178,012,800,000	423,360,000,000
Sugarcane	517,000	517,000	783	1,200	66,395,236,000	101,745,600,000
Barley	500	2,000	8	25	2,567,040	195,146,880
Tomatoes	986	20,000	379	300	255,747,600	45,804,653,200
Chillies	1,415	4,000	23	100	64,950,000	6,237,017,840
Cucumber	144	2,000	438	1,250	37,117,500	15,180,833,500
Garlic	1,586	10,000	78	260	396,400,000	18,668,221,600
Lady Finger	2,766	5,000	114	175	493,194,000	493,194,000
Onion	23,606	50,967	153	222	2,889,000,000	24,137,879,816
Falsa	269	2,000	87	170	28,110,000	28,110,000
Mango	53,166	70,000	96	250	10,241,900,000	134,072,012,960
Citrus	17,286	103,716	211	400	4,376,340,000	309,513,664,800
Jowar	24,536	25,763	9	11	182,800,000	268,762,230
Fodder	455,000	455,000	618	708	33,747,000,000	33,747,000,000
Rapeseed	104,100	114,510	19	32	3,231,854,000	23,346,277,040
Sunflower	2,300	5,000	21	45	101,847,420	906,520,572
Water & Musk Melon	3,586	5,000	370	400	1,591,080,000	4,477,306,560
Total					**533,958,548,701**	**1,511,893,966,646**

SOURCE: CROP REPORTING SERVICE

9. EXPORT POTENTIAL OF CROPS

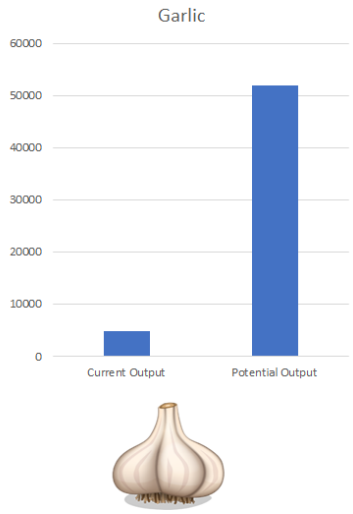
The objective is to induce growth in the cropping sector by enhancing productivity, improving farmer profitability, encouraging diversification, increasing market, and trade competitiveness, fostering encouraging private investment and improving the supply-chain mechanism. The primary goal of the Bahawalpur Regional plan is to enhance financial inclusion in the agriculture sector to boost productivity and exports, thereby enabling rural development-driven economic growth.

For instance, if we look at the total export of Mango ($875 Million) and Citrus ($2.1 Billion), the figures indicate the potential of these two crops that could extend to the expected export of $774 Million and $1.9 Billion respectively.

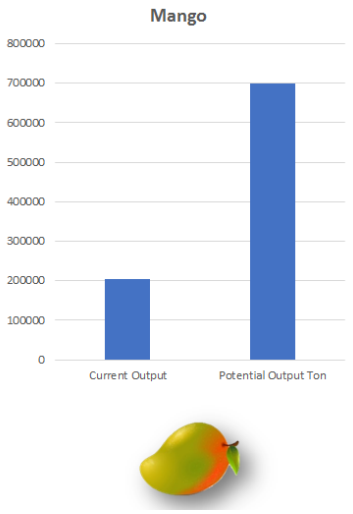
Henceforth, if we can develop a value chain of these recommended crops, then a significant increase in the exports of the country would be achieved. This further explains the need to focus on the improvement of value addition processes of citrus and mango, by establishing the latest industries, which are capable of improved processing of citrus and mango, and its byproducts. This will increase the high-value productivity and sale in the domestic as well as international market, which will, in turn, increase the farmer's income.

In addition to these major crops, Pakistan requires rapid expansion in the production of fruits, vegetables, and pulses. To lower their domestic prices and make the products more accessible then these products need to be used to meet future food demand and even enhance exportability. A strategic approach necessitates that the Bahawalpur agricultural sector employs scientific methods reforms that are the result of extensive research and development to foster agricultural productivity and yield.

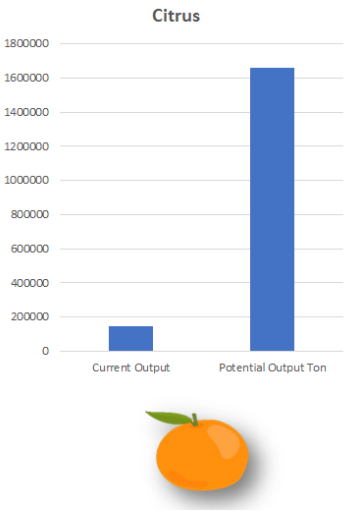
World Export ($) 2020	3.15 Billion
Pakistan Current Export ($)	2 Million
Expected Export from Bahawalpur ($) 2030	114 Million
Total Export ($)	56 Million



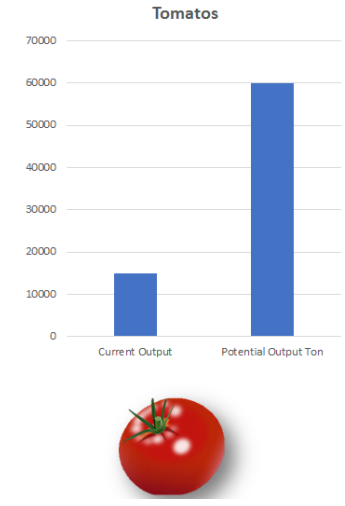
World Export ($) 2020	4.5 Billion
Pakistan Current Export ($)	101 Million
Expected Export from Bahawalpur ($) 2030	774 Million
Total Export ($)	875 Million



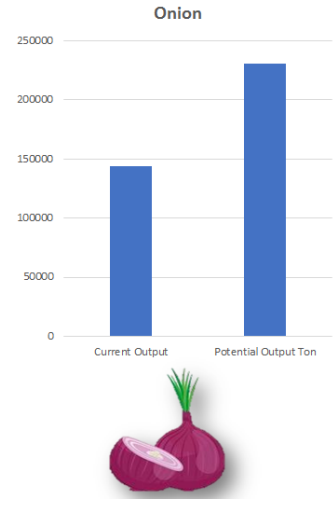
World Export ($) 2020	16 Billion
Pakistan Current Export ($)	205 Million
Expected Export from Bahawalpur ($) 2030	1.9 Billion
Total Export ($)	2.1 Billion



World Export ($) 2020	9 Billion
Pakistan Current Export ($)	3.6 Million
Expected Export from Bahawalpur ($) 2030	57 Million
Total Export ($)	60.6 Million



World Export ($) 2020	3.9 Billion
Pakistan Current Export ($)	124 Million
Expected Export from Bahawalpur ($) 2030	53 Million
Total Export ($)	177 Million



World Export ($) 2020	4.7 Billion
Pakistan Current Export ($)	3.5
Expected Export from Bahawalpur ($) 2030	38 Million
Total Export ($)	41 Million

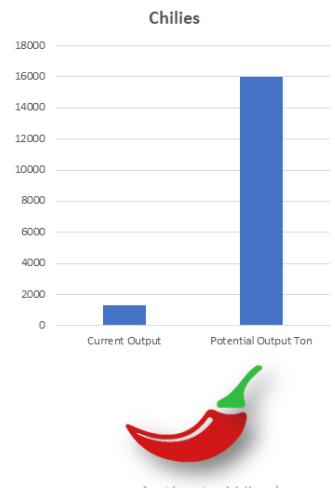


Figure 15: **EXPORT POTENTIAL OF CROPS**

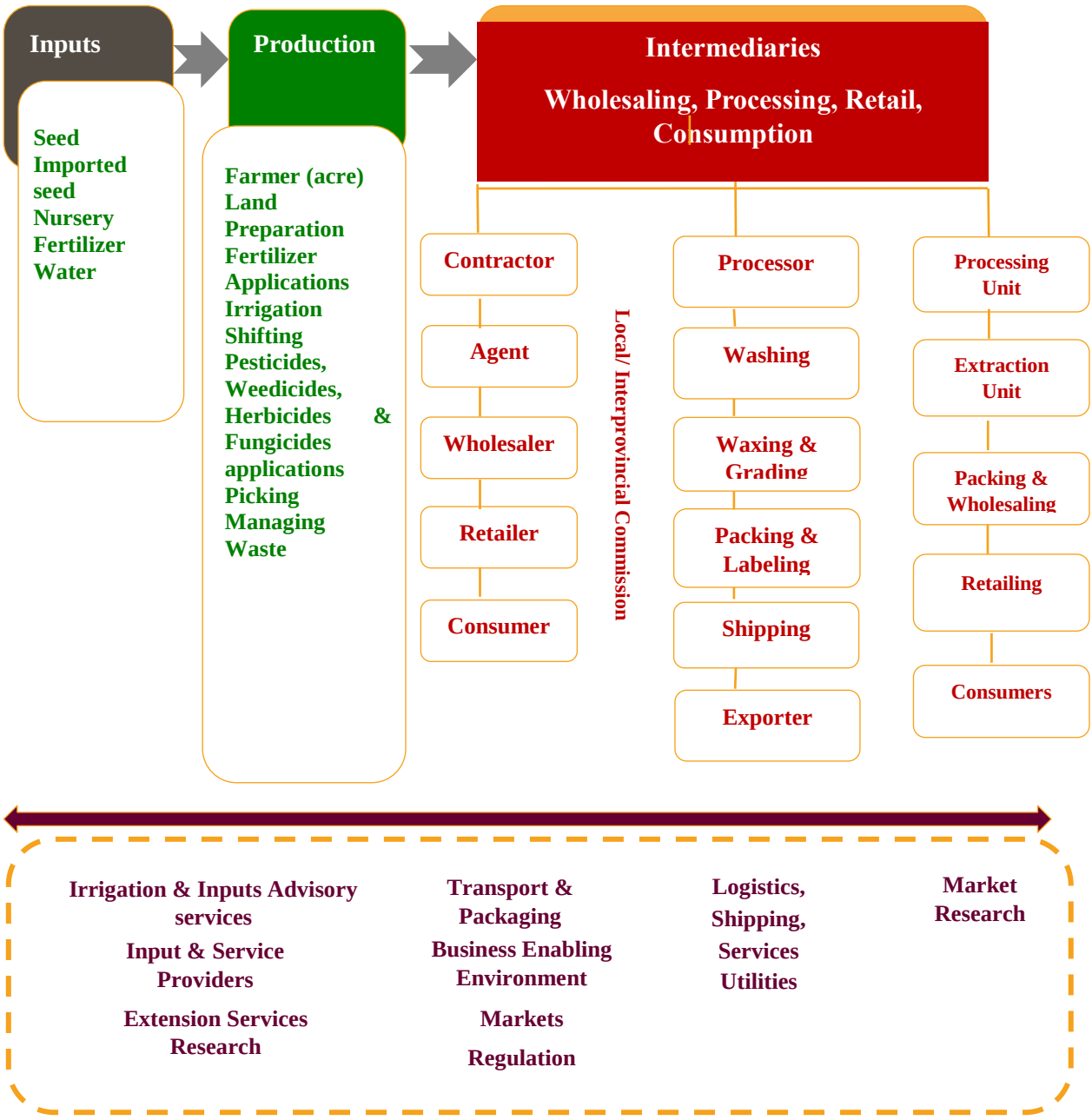
Source: Trade Map

10. VALUE CHAIN ANALYSIS

Agri-food Value Chains are designed to increase competitive advantage through collaboration in a venture that links producers, processors, marketers, food service companies, retailers, and supporting groups such as shippers, research groups, and suppliers.

The stages involved in the process of value-chain are: The first is input supply, then production, collection, processing, and then retailing. The intermediaries are the actors in the chain that are involved at each stage that belongs to local and interprovisional commissions. In some cases, the same actor may be involved in more than one stage. The diagram also represents the institutions that help support the actors in the value chain.

Based on the value chain framework, various value-chains are devised for each crop which helps in explaining the analysis, strategy development, planning, and implementation and also presents a birds eye's view on the analytical stage of the proposed value chain projects.


Inputs
Seed
Imported seed
Nursery
Fertilizer
Water
Production
Farmer (acre)
Land Preparation
Fertilizer Applications
Irrigation
Shifting Pesticides, Weedicides, Herbicides & Fungicides applications
Picking
Managing Waste
Intermediaries
Wholesaling, Processing, Retail, Consumption
Contractor
Agent
Wholesaler
Retailer
Consumer
Local/ Interprovincial Commission
Processor
Washing
Waxing & Grading
Packing & Labeling
Shipping
Exporter
Processing Unit
Extraction Unit
Packing & Wholesaling
Retailing
Consumers
Irrigation & Inputs Advisory services
Input & Service Providers
Extension Services
Research
Transport & Packaging
Business Enabling Environment
Markets
Regulation
Logistics, Shipping, Services
Utilities
Market Research

10.1 COTTON VALUE CHAIN

Cotton is grown almost all over the world from times immemorial with probable earliest documentation of cotton usage from the time when Peruvian mummies were clothed in it. At present cotton is grown all over the world, i.e. in India, the USA, Russia, China, Brazil, Egypt, Pakistan, Turkey, Mexico, and Sudan are leading cotton-growing countries. Cotton is an important fiber crop that plays a critical role in the economic and social affairs of people. Cotton is grown chiefly for its fiber and also for several other purposes such as for making threads for mixing with other fibers and for extraction of oil from cottonseed and leftover can also be used as animal feed in the livestock sector. All these uses give a high industrial value to this crop.

10.1.1. GLOBAL COTTON PRODUCTION

Cotton is grown in subtropical and seasonally dry tropical areas in both the northern and southern hemispheres, although most of the world's production takes place north of the equator. The main producing countries are India, China, the United States, Brazil, and Pakistan. Together, these countries account for more than three-quarters of global production.

The graph shows the world's leading cotton-producing countries in the crop year 2020/2021. In that year, cotton production in China amounted to around 6.42 million metric tons whereas Pakistan is producing 980 million metric tons and is at fifth position in terms of global production.

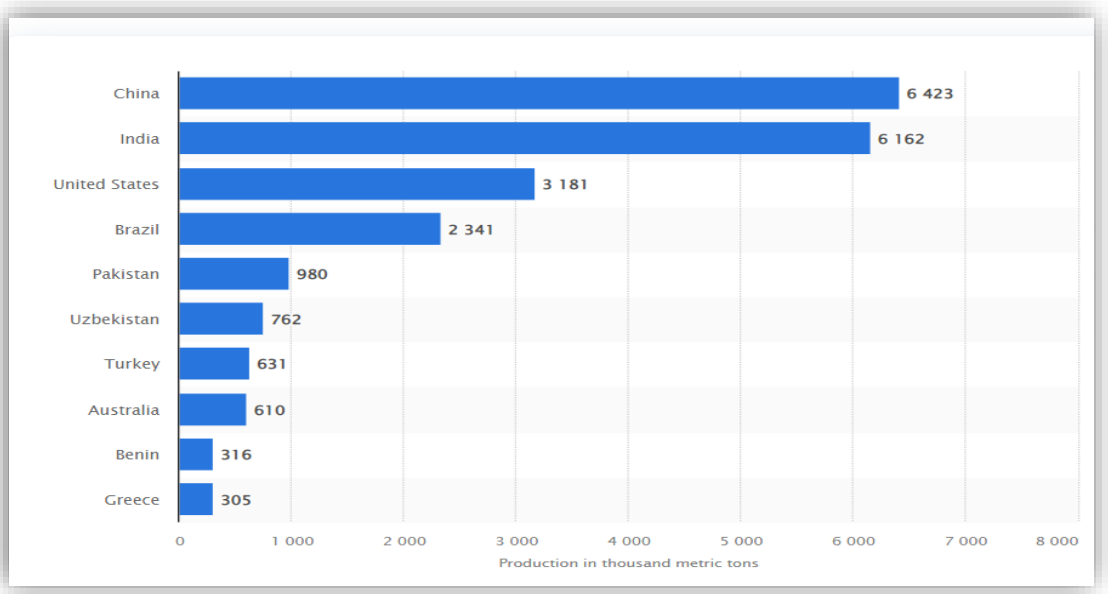


Figure 16: **GLOBAL COTTON PRODUCTION**

Source: Statista

Pakistan Exports of cotton were US$3 million during 2019. For the year 2020, Worldwide Cotton Market was US$ 47 Billion. Pakistan stands at the 6th position globally producing US$ 2 million during the year 2020.

RANK	EXPORTER	EXPORTED COTTON (US$)	2019-20
1.	China	$11,000,906,000	-22.2%
2.	United States	$7,013,425,000	-11.3%
3.	India	$5,809,190,000	-3.2%
4.	Brazil	$3,319,722,000	+19.4%
5.	Vietnam	$2,692,468,000	-11.9%
6.	Pakistan	$2,642,547,000	-18.7%
7.	Turkey	$1,463,452,000	-15.5%
8.	Uzbekistan	$1,200,138,000	-7.2%
9.	Italy	$979,727,000	-22.6%
10.	Germany	$689,528,000	-15.3%

Figure 17: **COTTON EXPORTS**

Source: World Top Exports

Approximately 65 percent of Pakistan's cotton is grown in Punjab, which has dry conditions, and the rest is grown in Sindh, which has a more humid climate, with a negligible area under cotton in Khyber Pakhtunkhwa and Balochistan. Despite the Punjab potential, the Bahawalpur average lies at 19.72 acres.

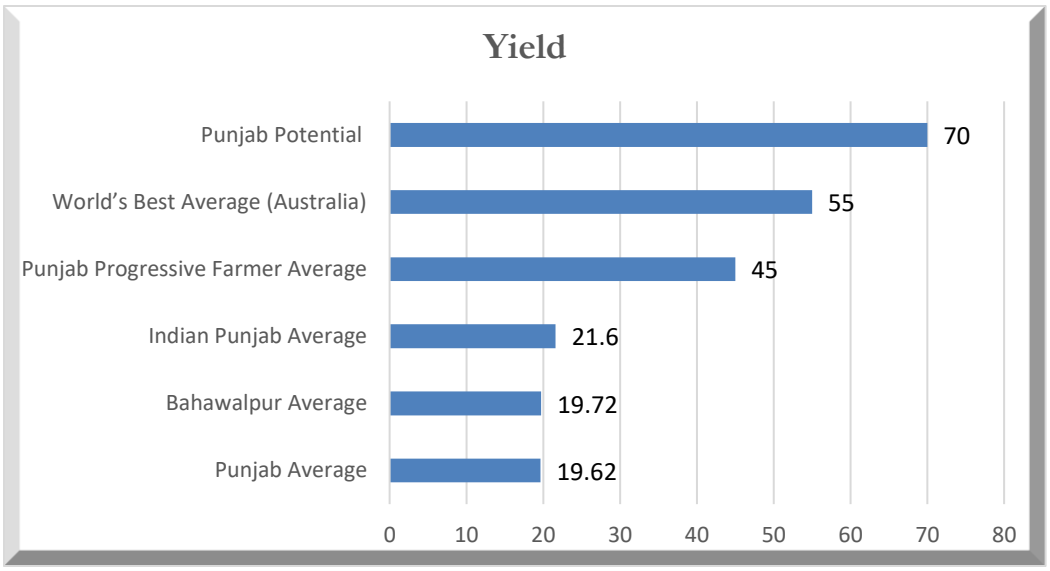


Figure 18: **COTTON YIELD (KGS/ACRE)**

Source: Agriculture Policy 2018

10.1.2. CHALLENGES AND ISSUES

Inputs	Production	Harvest	Logistics and Markets
Low Seed Quality Lack of proper seed production system Provision of uncertified seed The high moisture content at the time of ginning and storage of seed Slow approval of cotton varieties. High pest populations like pink bollworm, red cotton bug, and dusky bug can deteriorate seed quality. Inefficient Irrigation systems Shortage of Irrigation water Water quantity and quality issues	Awareness and capacity building of farmers and pickers Picking of undeveloped and immature bolls ultimately results in low germination. Rising temperature is gradually affecting the growth of the cotton plant. No disease-free zones were identified for new plantation Lack of extension Services and technical assistant Poor pest/disease management Change in rainfall patterns also affects the quality of cotton crop Specialized farmer training and cotton clinics Floods pose an imminent threat to cotton production in Pakistan Low provision of Fertilizers, Pesticides Inappropriate and excessive use of pesticides and fertilizers	Traditional methods of picking cause losses and more time taking Unavailability and less use of mechanization The quality of the cotton product is not of the required standards of the market The cost of production is the most significant among them High cost of production and insecurity in the market Lack of availability of Machinery	Lack of regulation Poor marketing infrastructure Lack of marketing campaign for local consumption Technically sound and mobile extension agents Awareness about and integration with BCI international volunteer standards Unavailability of ease of credit

10.1.3. RECOMMENDATIONS

Inputs	Farms Management & Zoning	Marketing & Access to Finance
Production of early generation seed i.e. breeders' nucleus seed (BNS) and Pre-Basic Seed (PBS)	A roller ginning machine may be introduced to increase staple length and fiber strength.	Latest GMO technology acquisition from foreign countries
Refining the role of Punjab Seed Corporation and private seed companies.	Nutrition Management of Cotton	Announcement of minimum support price for cotton
Expediting the process of cotton seed development and certification.	Pink Bollworm Management	Ban on cotton import from September to March
Using of modern technologies for Reduction in trash from 8% to 3% and losses in germination	Establishment of an autonomous excellence center for cotton research and development at Bahawalpur Market	Promotion of improvement of soil health
Imposition of Fines and legal action for supplying and sale of registered varieties.	Germplasm enhancement	Ensure credits and rewards for progressive cotton farmers for quality seed production
Open auction of Pre-basic seed at higher rates with a 25% share of the breeder(s).	Biological control through the establishment of Biocontrol Labs	Establishing local markets in the Bahawalpur division to promote cotton production
Up-gradation of Seed grading and processing facilities	Launching of integrated pest management (IPM).	Establishing and promoting ginning and textile industry in the cotton belt to developing farm to industry linkages.
Breeding for high seed and climate-resilient index varieties	The active role of Monitoring Teams is to Monitor farm practices and environmentally un-approved transgenic crop varieties.	
	Fixing of cotton window (Sowing window may be re-standardized)	
	Exploring new potential pockets in all four provinces	

10.2 WHEAT VALUE CHAIN

Wheat is one of the four main crops in Pakistan (i.e., rice, cotton, and sugarcane), with 80 percent of farmers growing it on an area of around 9.0 million hectares (close to 40 percent of the country's total cultivated land) during the winter or "Rabi" season. Marketing year (MY) 2019/20 wheat production is forecast at 25.6 million metric tons, two percent higher than the revised wheat production of 25.1 million metric tons, a year ago mainly due to conducive weather conditions and appropriate rainfall during the growing season.

10.2.1. GLOBAL WHEAT PRODUCTION

The main producing countries of wheat include India, China, the United States, Russia, and Pakistan of which Pakistan is at the 6th position globally.

The top 5 countries (India, Russian Federation, the United States of America, and Canada) account for 63.46% of it. The world's total wheat production was estimated at 649,759 thousand tonnes in 2020 (Wheat Production by Country, 2019).

Although Pakistan produced a record wheat crop of 26.7 million tonnes in the 2021 year, it was insufficient to meet the country's domestic consumption requirements and maintain large strategic reserves, according to a recent Global Agricultural Information Network report from the Foreign Agricultural Service of the US Department of Agriculture (USDA).

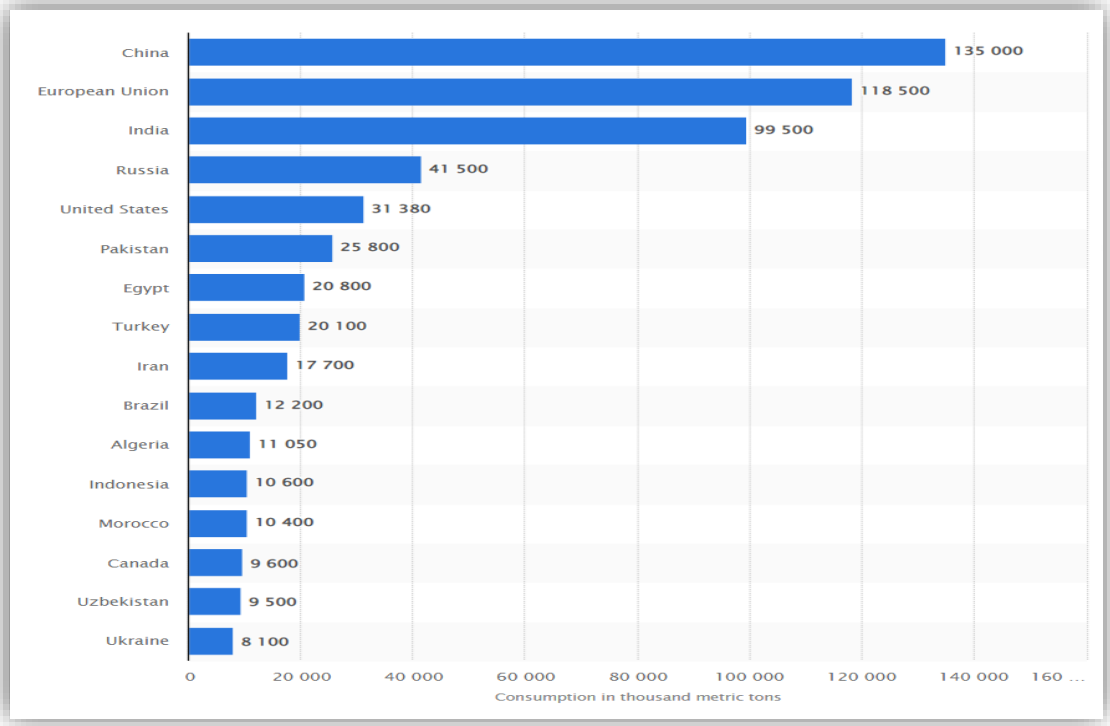


Figure 19: **GLOBAL WHEAT PRODUCTION**

Source: Statista

Wheat production is expected to be 27 million tonnes in the 2021-22 marketing year, an 8% increase over the 25 million tonnes produced in the previous year (Demaree 2019).

Leading world wheat exporting countries (2001–2020) are shown below in the figure. Australia, Argentina, Canada, France, Kazakhstan, Russia, Ukraine, and the USA are the largest wheat exporting countries in the world. In 2020, they accounted for 153 million t of wheat exports, which corresponds to 77% of the total wheat exports in this year. Abbreviation: ROW, rest of the world.

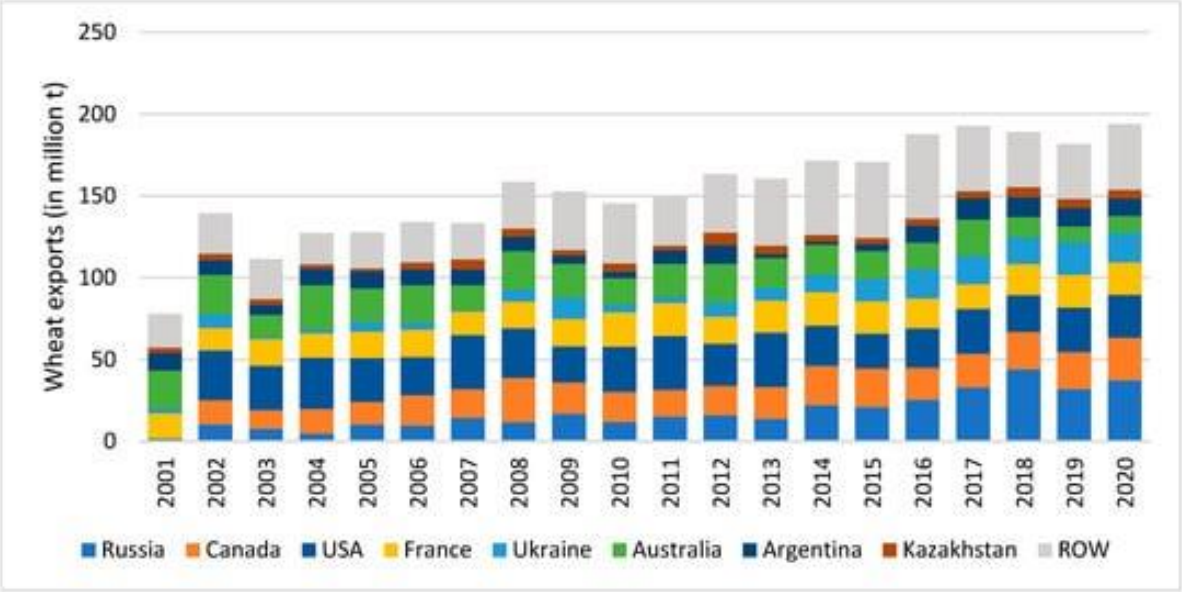


Figure 20: **GLOBAL WHEAT EXPORTS**

Source: Trade Map

The graph shows the Bahawalpur average at 35.82 acres which is near to Punjab average that is 31.34 acres. However, the progressive farmers and the international farmers are getting higher yields which shows that there is huge potential for productivity enhancement.

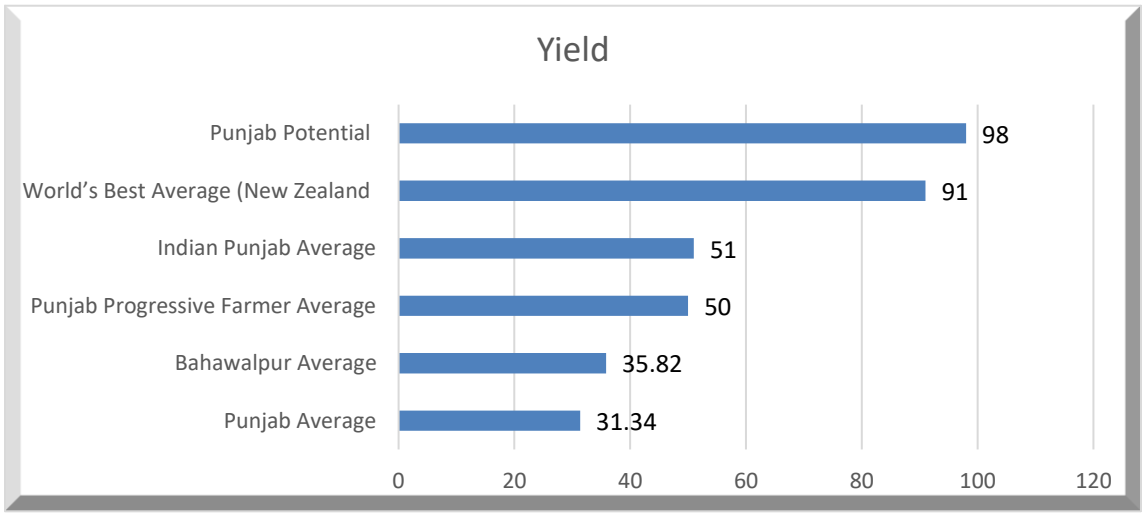


Figure 21: **WHEAT YIELD**

Source: Agriculture Policy 2018

10.2.2. CHALLENGES AND ISSUES

Inputs	Production	Harvest	Markets & Logistics
Unavailability of quality seed	The limited capacity of farmers	Re-evaluation of optimum sowing time in various ecologies considering the prevailing climatic changes	Poor marketing infrastructure
Delayed Planting	Spread of diseases	Quality assurance mechanisms and standardized certifications for export are missing.	Lack of marketing campaign for local consumption
Lack of quality wheat	Lack of extension Services and technical assistant	Lack of modern Harvesting technologies	Lack of market research/ market identification
Soil Salinity	Poor pest/disease management	Access to finance problem	Poor access to the high-end market
Lack of irrigated water supplies	Drought/ Terminal heat stress	Low and inadequate quality of existing storage facilities	Lack of presence at international exhibitions/ trade shows
Water Shortage	Water Infestation	Post-Harvest Losses	Lack of support from trade counselors posted abroad in opening new markets/relationship management in existing markets
Low quality of pesticide	Non-availability of soil moisture in rainfed areas delays wheat sowing		The transportation supply chain needs to be made efficient
	Improper land leveling		
	Drainage problems		
	Agronomic constraint		
	Inefficient fertilizer use		
	Imbalance uses of Nutrition		

10.2.3. RECOMMENDATIONS

Inputs	Farms Management & Zoning	Marketing & Access to Finance
Availability of Seed of Recommended Varieties	Availability of skilled and trained labor	Establishment of Research Collaboration/Linkages
Availability of inputs (fertilizers, herbicides, electricity, diesel, etc.)	Farm Mechanization	Annual Wheat Meeting to discuss strategies to enhance the wheat production
To increase yield potential, introduce Germplasm Acquisition, Evaluation, and Distribution	Awareness and training of farmers on standardized Wheat farming management and improved irrigation practices	Traveling Wheat Seminar activity of coordination to bring all stakeholders in close contact
Timely availability of water	Training of labor on the usage of processing equipment	Improved local markets, & international linkages
On-going varietal development based on market research	National Uniform Testing and Variety Release for Agro-ecological zones.	Provide an incentive for setting up new industries
Seed replacement programs.	Technology Transfer to developing decision support systems that could provide site-specific recommendations/ guidelines	Agricultural credit for realizing production target of any crop
Special program for the Seed Companies for certified wheat seed production.	Subsidy on implements for wheat.	
Implementation of amended seed act for wheat varieties registration.	Development of Smart tools for mechanization especially for small farmers.	
To develop climate-smart high yielding, rust, and heat stress-tolerant varieties of wheat.	Subsidy on Weedicide.	
Develop Linkages with academia and international researchers for R&D	Subsidy on gypsum & green manuring.	
	Provision of extension services	

10.3 MANGO VALUE CHAIN

Pakistan has the production capacity and export development focus to be a leading global mango exporter, as well as the potential to be able to grow market share into the lucrative market of Europe with consistent supply. However, as Pakistan has some volatility in its supply, its trade capacity needs to be developed to meet a steady export commitment.

10.3.1. GLOBAL MANGO PRODUCTION

In 2019, India had the highest mango, mangosteen, and guava production throughout the Asia Pacific region, in which over 25.6 million tons of mangoes, mangosteens, and guavas were produced. Comparatively, Bhutan produced approximately just 2.04 thousand tons of mangoes, mangosteens, and guavas in 2019. It can be seen in the figure below that Pakistan's production lies at the fourth position producing 2.2 million tons (“APAC: Mango, Magosteen and Guava Production by Country” 2021).

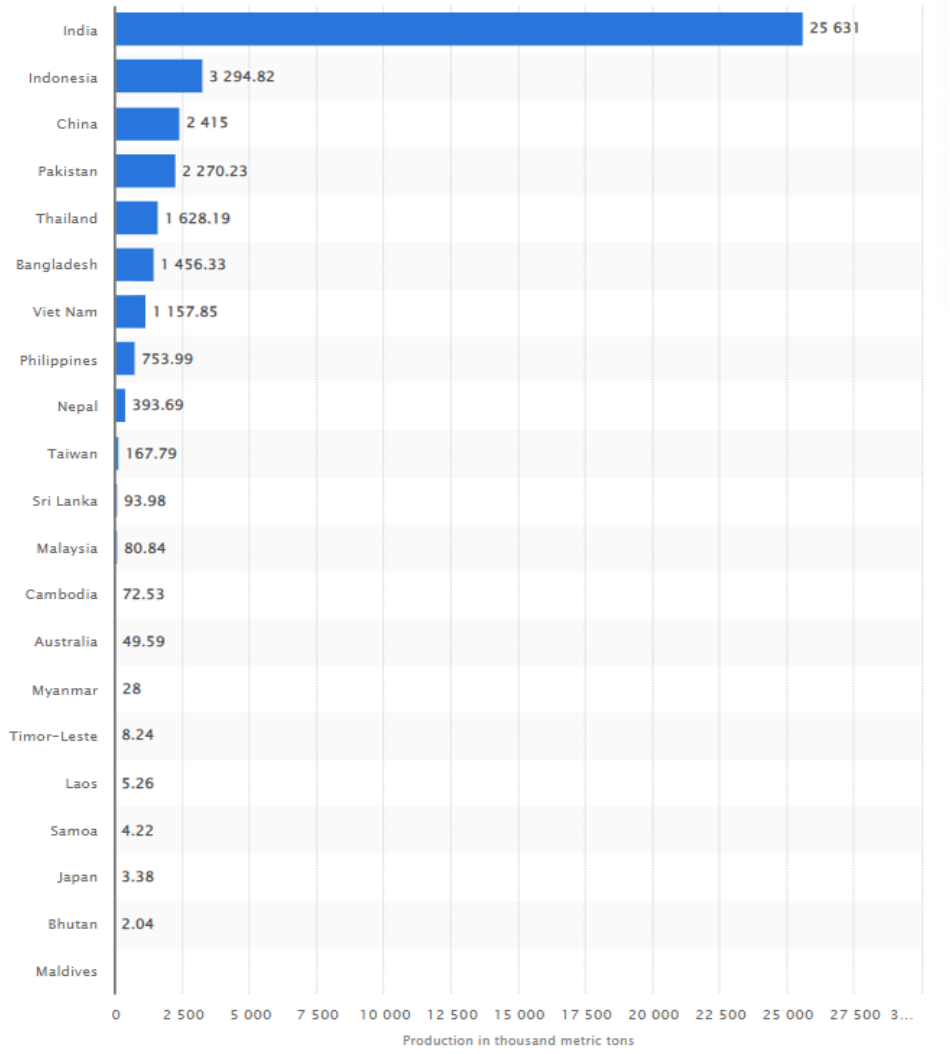


Figure 22: **GLOBAL MANGO PRODUCTION**

Source: Statista

Mango is a highly nutritious and healthful fruit containing rich quantities of prebiotic fiber, vitamins A and C along with a smaller quantity of vitamin B, protein, and minerals. It is a tropical fruit and thrives in sandy loam soil with hot and dry weather in well-drained land. Indicative export unit values for mango largely follow regular seasonal variations. Volume trends of leading exporters from 2014-2018 as per FAO Market Review 2018 are as follows:

Figure 23: **FRESH OR DRIED GUAVAS, MANGOES, AND MANGOSTEENS (US$ 000)**

Source: Major Tropical Fruits Market Review, FAO (2018)

Mango suffers from low productivity, low quality, high wastage, and low exports. Fruit quality is generally good but 30 to 40 percent of fruit gets wasted during post-harvest handling. There is a lack of modern storage facilities, and postharvest treatment and transport mechanisms are almost non-existent. Periodic gluts occur on domestic markets as the markets cannot store fruit. The export market faces similar challenges. The per ha yield of mango in Pakistan is around 10 tonnes per ha. The yield is highest in Punjab followed by Sindh while it is lowest in Balochistan. However, in the Bahawalpur division, Mango can be seen the most in the Rahim Yar Khan district covering all three tehsil Khanpur, Liaqatpur, and Rahim Yar Khan. The Bahawalpur division average at 96.32 acres which is near to Punjab average that is 135.02 acres.

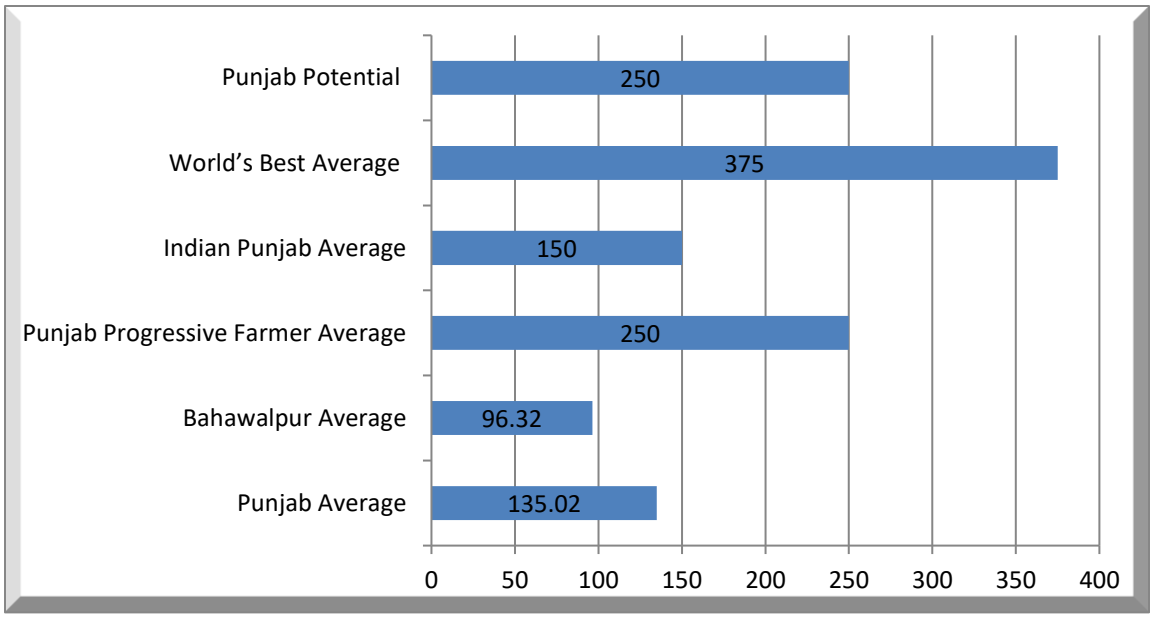


Figure 24: **MANGO YIELD**

Source: Agriculture Policy 2018

10.3.2. CHALLENGES AND ISSUES

Inputs	Production	Harvest	Markets & Logistics
Non-availability of appropriate quality fertilizer and micronutrients	Lack of extension Services and technical assistant	Lack of modern technology	Lack of farmers' connection with markets.
Declining organic matter in soils	Poor pest/disease management	Access to finance problem	Poor marketing infrastructure
Limited availability of certified, quality, and pure variety seed/seedlings	Lack of capacity to address the emerging issues in such as high-density gardens, IPM, etc.	Low automation	Lack of marketing campaign for local consumption
Water quality and availability	Intercropping with Mango orchards	Lacking infrastructure for quality maintenance	Lack of market research/ market identification
Low-quality inputs in the market	Flooding irrigation wastes water and deteriorates Mango quality	Lack of capacity and resources for small scale stakeholders to get involved in processing	No contract farming with defined quantities and quality parameter
	Inefficient use of pesticide	Few farmers adopt the latest technologies such as de-sapping to lower the mango temperature after harvesting and hot-water treatment to disinfest diseases	Little credit availability from formal institutes for any actor of cluster
	Imbalance uses of Nutrition	Improper harvesting procedure	Low and inadequate quality of existing storage facilities
	Imbalance and sub-optimal use of fertilizer		The transportation supply chain needs to be made efficient
	Prolonged winter and sudden temperature rise affect flowering and Mango settings		Improper stacking during transportation

10.3.3. RECOMMENDATIONS

Inputs	Farms Management & Zoning	Marketing & Access to Finance
Availability of inputs (fertilizers, herbicides, electricity, diesel, etc.) Development of certified seed/Nursery system (Development and introduction of local marketable varieties) Linkages with academia and international researchers for R&D Timely availability of water and other inputs Provision of integrated/specialized extension services On-going varietal development based on market research Promotion of Certified Nurseries	Availability of skilled and trained labor Farm Mechanization Training program on plant protection, Harvesting, Packing, and processing of mango Promotion of High-Density Plantation. Development of Cluster and Site-Specific Appropriate Management Practices. Developing Integrated Pest Management (IPM) Strategies Capacity Building of farmers Cultivation of Mango on High-density Planting under Drip Irrigation in new areas.	Mapping of countries and markets for the target mango production should be carried out. Specific compliance, customs regulations, packaging requirements, and other related prerequisites of exports to these markets shall be identified. Logistics viz-a-viz cost of mango should be determined. Keeping in view potential international markets and compliance requirements thereof, a detailed marketing strategy with an overall aim to enhance exports to potential high-value export markets must be designed. Strengthening of R&D Institutes Social Mobilization & Networking Ease of financial access and insurance bundle services. Establish/ update Cold Storage/Controlled atmosphere facilities for local and international market/Mandi to increase shelf life

10.4 SUGARCANE VALUE CHAIN

According to the International Sugar Organisation, nearly 130 countries in the world participate in sugarcane and sugar beet production and have been providing the world with four major products including cane tops, bagasse, filter muds, and molasses. Being one of the easiest crops to grow, it has been providing countries with a sizable revenue, which has acted as a major growth driver for the global market. Since granulated sugar and liquid sugar are used in nearly all cuisines and high amounts because of rapid urbanization, the demand for sugarcane is expected to increase. In 2018, the global sugarcane market size stood at $23.60 billion. During the forecast period 2019–2025, the sugarcane market is deemed to grow at a compound annual growth rate (CAGR) of 1.80% ("Pakistan Sugarcane Market Research Report: Market Size, Industry Outlook, Market Forecast, Demand Analysis, Market Share, Market Report 2021-2026" n.d.).

10.4.1. GLOBAL PRODUCTION OF SUGARCANE

- Brazil is the largest sugarcane producer in the world with 746,828,157 tonnes of production per year.
- India comes second with 376,900,000 tonnes yearly production.
- With 108,718,971 tonnes of production per year, China is the third-largest producer of sugarcane.

	Country	Production (Tons)	Production per Person (Kg)	Acreage (Hectare)	Yield (Kg / Hectare)
	Brazil	746,828,157	3,564.251	10,042,199	74,369
	India	376,900,000	282.009	4,730,000	79,682.9
	China	108,718,971	77.998	1,414,973	76,834.7
	Thailand	104,360,867	1,508.472	1,372,169	76,055.4
	Pakistan	67,173,975	332.755	1,101,946	60,959.4
	Mexico	56,841,523	455.688	785,905	72,326.2
	Colombia	36,276,860	726.569	408,716	88,758
	Guatemala	35,568,207	2,055.718	300,246	118,463.7
	Australia	33,506,830	1,337.63	442,958	75,643.4
	United States of America	31,335,984	95.605	364,096	86,065.2

Figure 25: **GLOBAL SUGARCANE PRODUCTION (2018-2020)**

Source: World Population Review

Pakistan's Marketing Year (MY) 2020/21 sugar production is forecast at 5.9 million metric tons (MMT), a six percent increase from the current year's revised estimate due to an expected increase in sugarcane area. Sugar consumption for the same year is forecast at 5.8 MMT, moderately higher than last year's estimates, and exports are forecast at 400,000 metric tons. Ending stocks are expected to decrease to 1.9 MMT. The current year's production estimates are revised up slightly from last year mainly due to an increase in productivity. MY 2018/19 sugar exports stand at 600,000 tons mainly due to a subsidy of $35 per metric ton provided to sugar exporters. Sugar prices jumped 33 percent in March 2020 compared to the same period last year.

The government ensures sugar exports through quotas to ensure sufficient local supplies. Significant production in the Rahim Yar Khan district has been observed with an overall contribution in all districts of Bahawalpur.

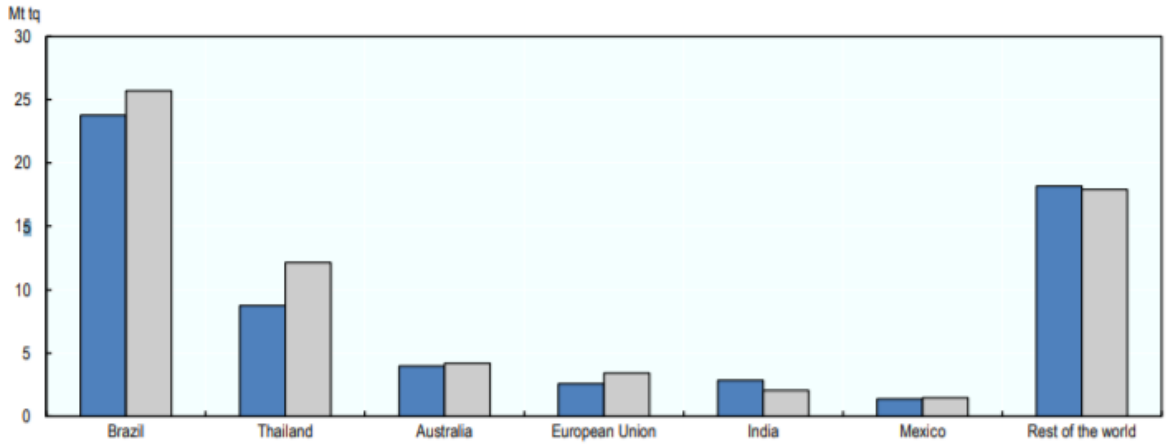


Figure 26: **PAKISTAN EXPORTS OF SUGARS AND SUGAR CONFECTIONERY**

Source: OECD Agriculture statistics 2019

Pakistan is the fifth largest sugarcane producer in the world with an annual production of 63,800 thousand metric tons (TMTs), after Brazil, India, China, and Thailand. Pakistan's marketing year (MY Oct/Sep) 2021/22 sugarcane production is forecast at **83 million metric tons** (MMT), up to ten percent from the revised 2020/21 estimate, due to an increase in area and sugarcane yields.

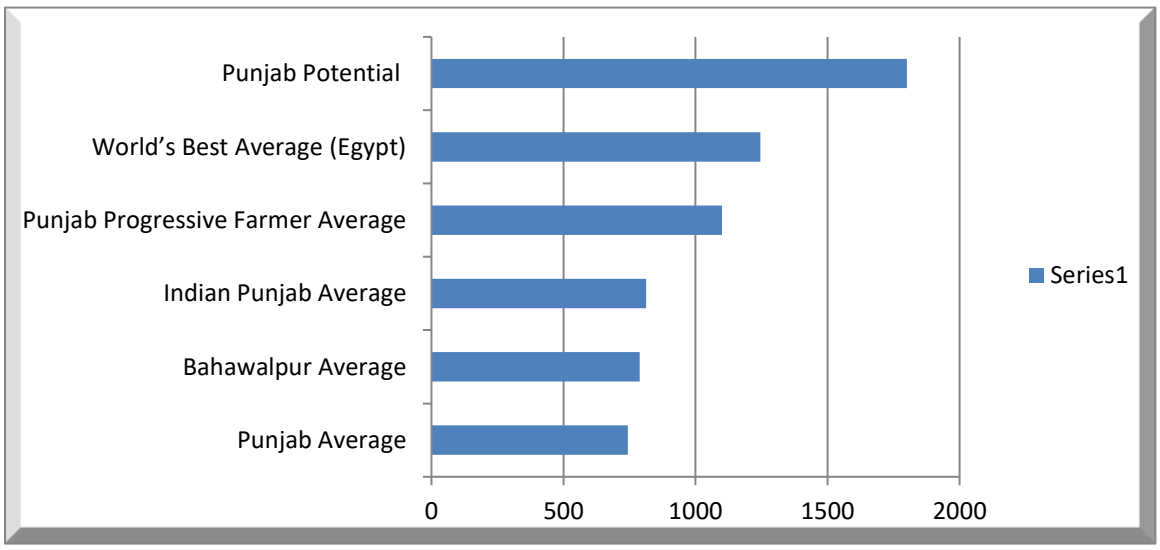


Figure 27: **SUGARCANE YIELD**

Source: Agriculture Policy 2018

10.4.2. CHALLENGES AND ISSUES

Inputs	Production	Harvest	Markets & Logistics
Non-availability of drought and salt-tolerant sugarcane varieties	Only 50-60% area is under approved good quality varieties	Lack of modern technology	Role of the middle man.
Low seed rate	Improper pest management	Access to finance problem	Lack of regulation
Poor plant protection measures	Low quality of pesticide.	Low-quality cane procurement system i.e. mainly through a middleman	Poor marketing infrastructure
Weak varietal development program	Lack of extension Services and technical assistant	Harvesting delay due to late crushing	Lack of marketing campaign for local consumption
Increase in cost of inputs	Poor land preparation		Lack of market research/ market identification
	Climate changes		Poor access to the high-end market
	Control on the spread of unapproved and low sugar content varieties (CO-1148 in KPK, SPF-238 in Punjab & Disco in Sindh)		Untimely payments to farmers by the sugar mill

10.4.3. RECOMMENDATIONS

Inputs	Farms Management & Zoning	Marketing & Access to Finance
Development of climate-smart high-yielding varieties. DNA & all other required testings for mother plant and scion varieties Identification of demand in the international and local market Control of diseases Introduction of different varieties planted may be harvested according to their maturity. Germplasm Acquired/Distributed to date Availability of cheap and efferent Pesticides	Showcasing of Good Agricultural Practices (GAP) on balanced use of fertilizer, Weedicide application, and Integrated Crop Management (ICM). Promotion of water-saving technologies. Promotion of Intercropping, September Planting, and Chip Bud Technology. Availability of skilled and trained labor Adopt modern sugarcane harvesting technology, strengthening support services. Upgradation of Sugarcane Research Institute and capacity building of their staff Selection of cane varieties having resistance against biotic and abiotic stresses, high yield, and sucrose contents to be accomplished. Provision of extension services	Sugarcane value addition enhancement program. Improved local markets, & international linkages Provide an incentive for setting up new industries Develop feasibilities for new value add industries Linkages with academia and international researchers for R&D Improvement in cane growers' economic condition by increasing productivity per unit area.

10.5 TOMATO VALUE CHAIN

Tomato is one of the most important vegetables in the world. It is important to cash and industrial crop in many parts of the world. Tomato is the most common and important kitchen item cooked as vegetables, used as condiments, and salad in Pakistan. The consumption of tomatoes has high-income elasticity of demand. Thus, there will be more demand for these vegetables with population growth, economic growth, and urbanization. Among the vegetables, tomato is one of the most important vegetables in terms of acreage, production, yield, commercial use, and consumption. It is used as a food item on daily basis and forms a very important component of food consumed in Pakistan. Pakistan had a 150 thousand ha area and 57094 tons production of tomato. Sindh is the highest tomato-producing province with tomatoes grown on an area of 67.46 thousand hectares followed by Balochistan with 31.38 thousand hectares of the area while Punjab had 18.29 thousand ha under tomato cultivation.

Productivity improvement always remains the main thrust of all the economies in the world. Increasing productivity leads to increasing trade. Innovations, productivity, and exports have strong relationships. Developed countries are leading in per hectare productivity due to the use of advanced technology. Developing countries are following the path of productivity enhancement. Pakistan is a developing country with the fifth-most populous country. The majority of which is dependent on agriculture (67%) and 43.7 percent of the labor force is involved in the agriculture sector (GoP, 2014). Horticulture contributes 11% of the total value added in agriculture. Generally yield of different crops is stagnant except for major crops in Pakistan. In horticultural crops, tomato occupies a major position.

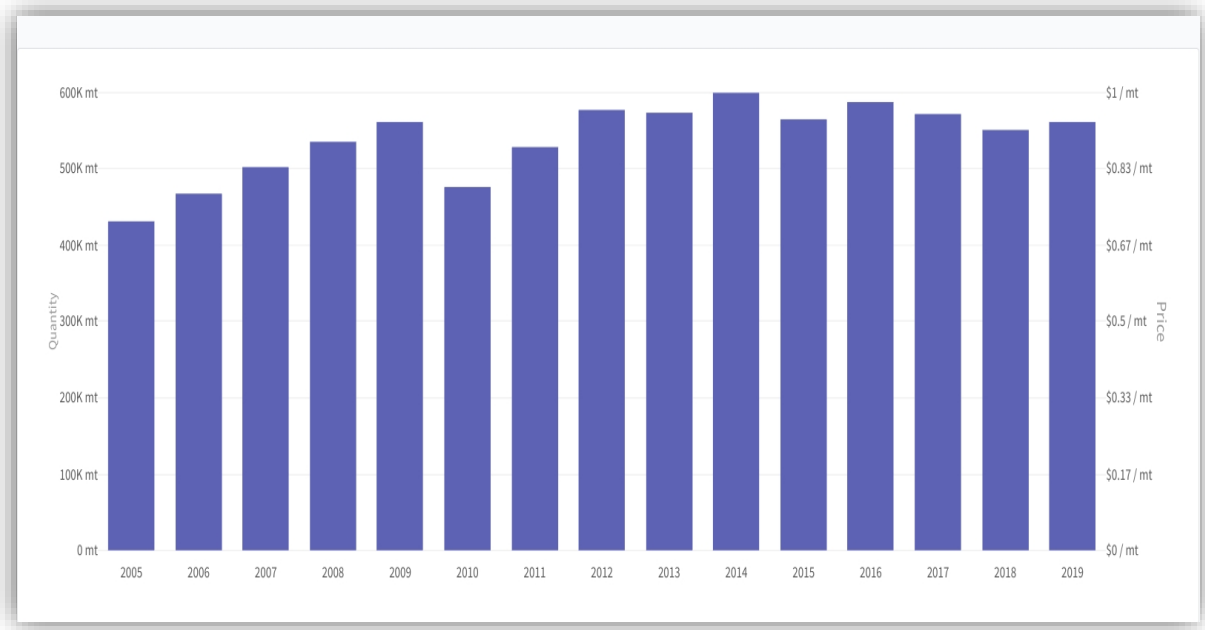


Figure 28: **TOMATO PRODUCTION**

Source: Statista

Type	Unit	2012	2013	2014	2015	2016	2017	2018	2019
Export Value	USD	4.19M	2.19M	5.54M	3.57M	9.47M	879.48K	8.67M	5.23M
Export Volume	Metric Ton	9.72K	5.43K	14.18K	9.27K	24.79K	2.09K	26.30K	19.54K
Export Unit Price	USD / Metric Ton	431.29	403.04	390.44	385.25	381.82	421.80	329.75	267.74

Figure 29: **TOMATO EXPORT**

Source: Trade map

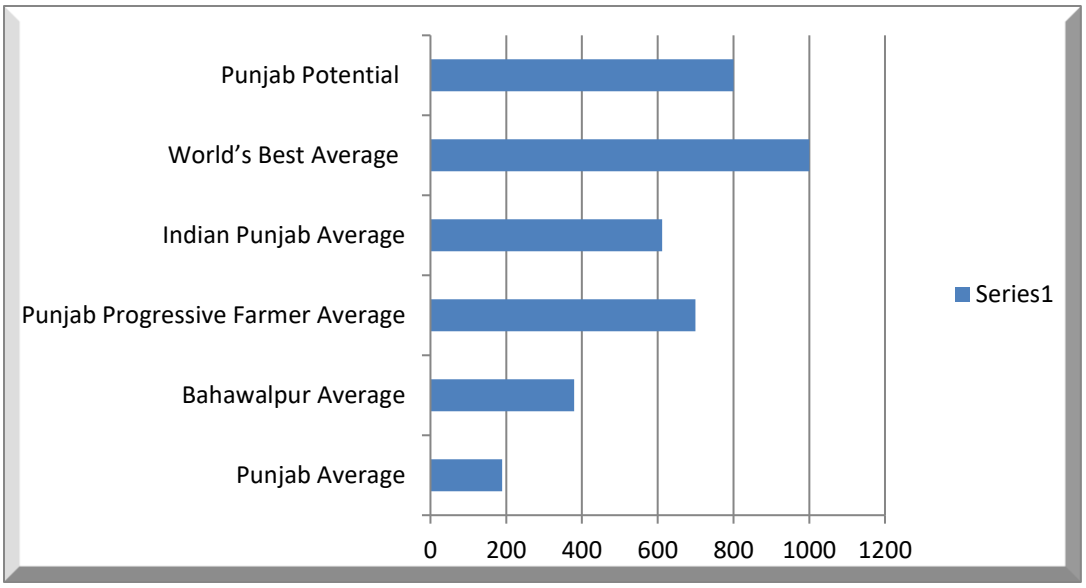


Figure 30: **TOMATO YIELD**

Source: Agriculture Policy 2018

10.5.1. CHALLENGES AND ISSUES

Inputs	Production	Harvest	Markets & Logistics
Expensive seeds	Shortage of Skilled Labor.	Post-Harvest Losses up to 20%	Role of the middle man.
Seed efficiency is 80 %	Most of the Production is in the Peri-Urban area due to the labor supply.	Incorporate modern harvesting technologies	Lack of regulation
No locally Produced Cheap seed available in the market	Fail to meet Demand annually because of limited capacity.	Inadequate and scarcity of existing facilities for Grading, Polishing, and sizing for local market demands.	Poor marketing infrastructure
Lack of institutional support to provide database and inventorying of certified, disease-free seed plants.	Inadequate supply of plants required for new zones.	Quality assurance mechanisms and standardized certifications for export are missing.	Lack of marketing campaign for local consumption
Unreliable supply of certified plants.	No disease-free zones were identified for new plantation	Lack of modern technology	Lack of market research/ market identification
Lack of registered nurseries	Low quality of pesticide.	Access to finance problem	Poor access to the high-end market
Poor nursery management practices	Low Price in the local market	Perishable goods and no storage capacities	Lack of presence at international exhibitions/ trade shows
	Lack of extension Services and technical assistant	No Pulping unit nearby.	Lack of support from trade counselors posted abroad in opening new markets/relationship management in existing markets
	Poor pest/disease management		
	Imbalance uses of Nutrition		

10.5.2. RECOMMENDATIONS

Inputs	Farms Management & Zoning	Marketing & Access to Finance
Availability of Cheap and HYV seeds in the market	Increasing cropping area and Declaring peri-urban area to be Tomato zones.	Developing state-of-the-art Cold-Storage
VRI to develop new seed varieties	Availability of skilled and trained labor	Improved local markets, & international linkages
DNA & all other required testing are for mother plant and scion varieties	Farm Mechanization	Provide an incentive for setting up new industries
Identify protocol for export of tomatoes to the various markets.	Availability of cheap and efferent Pesticides	Providing Pulping Units
Upgradation of VRI and capacity building of their staff	Awareness and training of farmers on standardized Tomato farming management and improved irrigation practices	Availability of alternative Value addition Products of Tomatoes.
Linkages with academia and international researchers for R&D	Training of labor on Grading, Sorting, Packaging, usage of processing equipment	Develop packaging manufacturing industry for fresh fruit
Timely availability of water and other inputs	Provision of extension services	Develop local manufacturing industry to manufacture Grading/Sorting/Packing lines
		Develop zoning-based state-of-the-art trading market.
		Identification of demand in the international and local market

10.6 CITRUS VALUE CHAIN

Pakistan is producing more than 30 types of different fruits of which citrus fruit is leading among all fruit and constitutes about 30% of total fruit production in the country. Above 90% of citrus fruits are produced in Punjab province and distributed through different value chains in domestic as well as in international markets. A large part of citrus fruit produced in Pakistan is mostly consumed locally without much value addition; however, 10–12% of total production is exported after value addition.

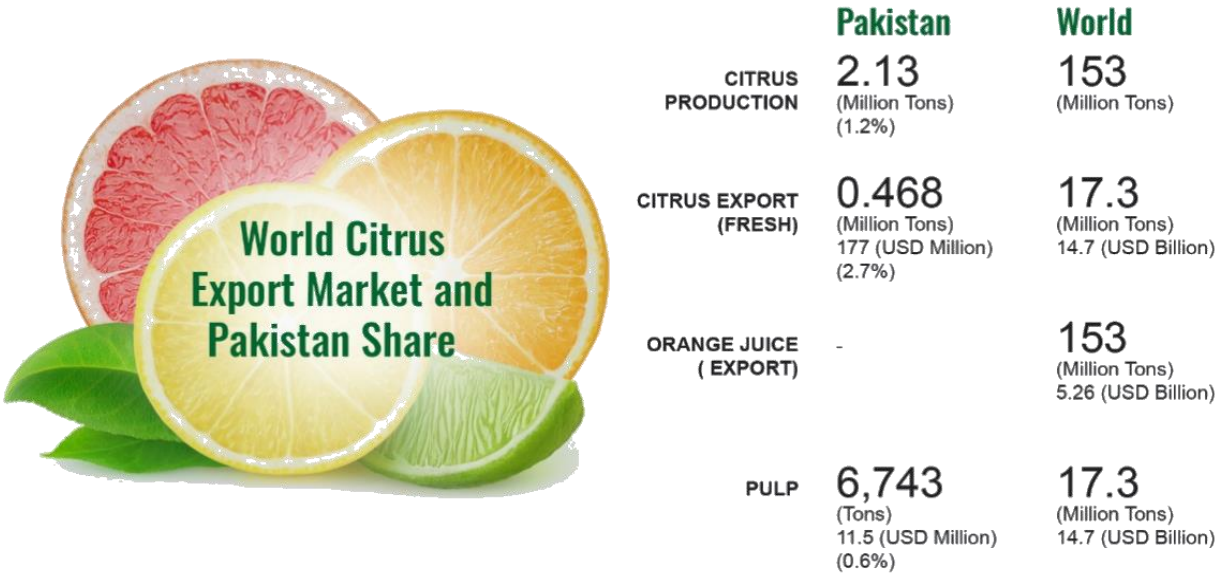


Figure 31: **CITRUS EXPORT MARKET SHARE**

Source: Trade map and FAO

In Pakistan citrus fruits are the most important fruit crops grown on an area of approximately 160,000 hectares with a production of 2.13 MMT annually, making it the 14th largest producer with global exports share of 2.7% making it the 19th largest exporter in terms of value and 10th largest in terms of quantity. It is grown in all four provinces of Pakistan, but Punjab produces over 95% of the crop because of its greater population, favorable growing conditions, and adequate water, in Bahawalpur, it is mainly grown in Mandi Bahuddin District. Citrus is divided into different groups Sweet oranges, Mandarine, Grapefruit, Lemon, and Lime which are being grown commercially.

World citrus production is increasing at 2.24% per annum, there is a huge potential to increase citrus production, which can be achieved with accurate interventions. Similarly, exports are increasing by 2.57%, hence to remain in the top citrus exporting countries there is an urgent need for the Government to provide an enabling environment with the requisite interventions to enhance the productivity of citrus.

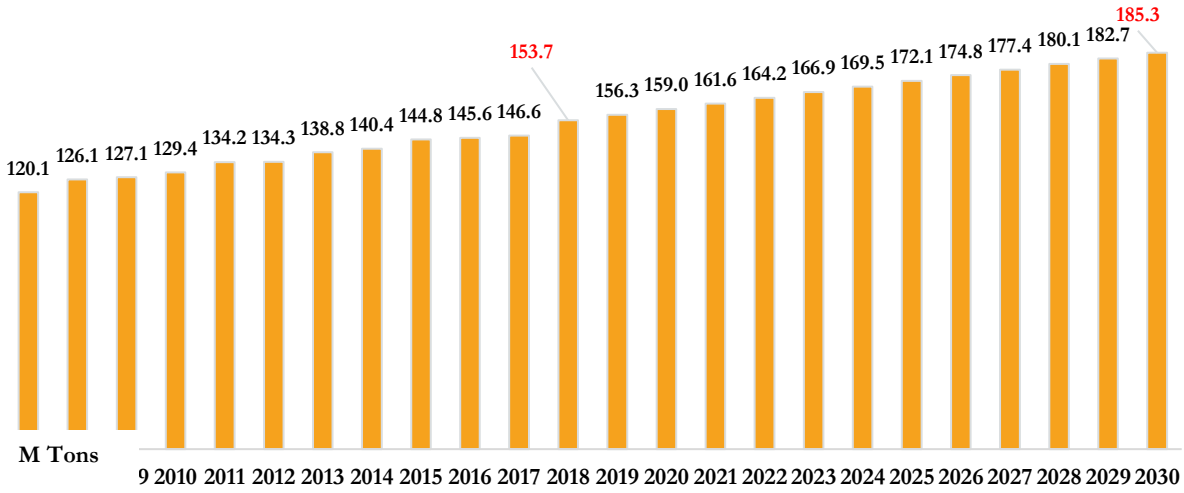


Figure 32: **CITRUS PRODUCTION**

Source: FAO

Pakistan ranks at number 10 among citrus exporting countries, Spain leading with 3,549,540 tons export value, there is a need to improve citrus quality to be among the top.

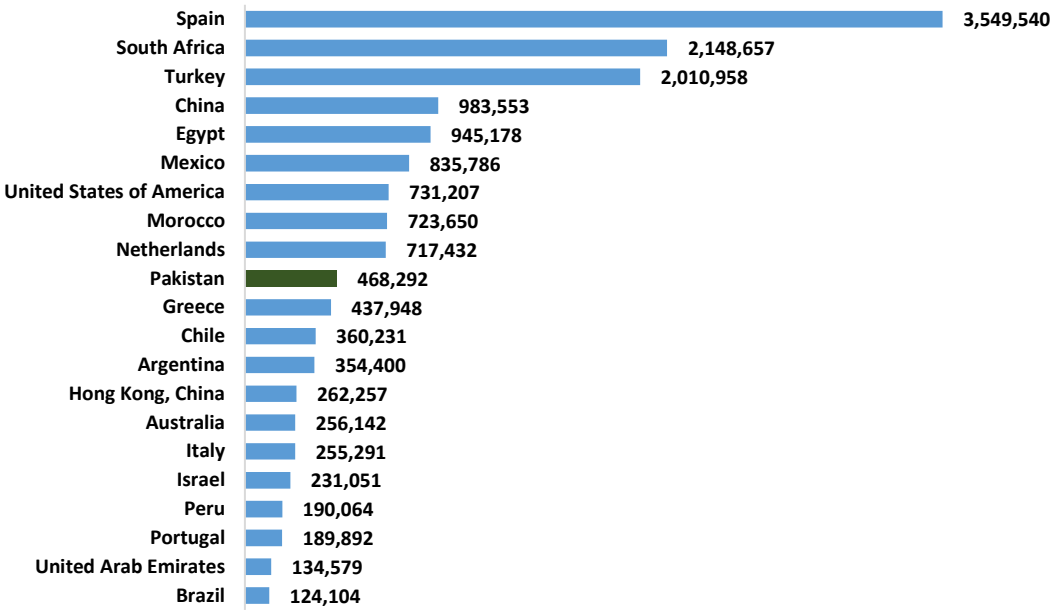


Figure 33: **CITRUS EXPORTS**

Source: Trade Map

Due to the low quality of citrus produced in Pakistan, it does not fall in the top 10 leading exporters when investigated by type of citrus exported, Pakistan only comes in the top 10 for Mandarin. Similarly, Pakistan produces extremely low yield (kgs/Acre) when compared to the top 3 countries yield in all citrus types, there is a need to adopt good agriculture practice and high density in orchards

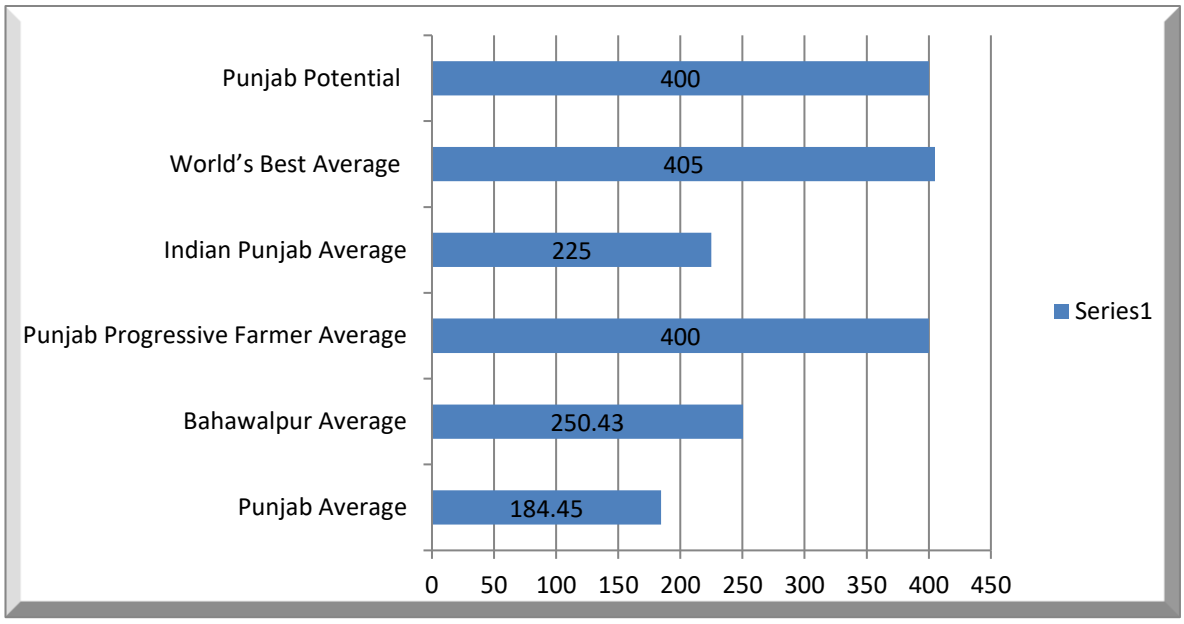


Figure 34: **CITRUS YIELD (KGS/ACRE)**

Source: FAO

10.6.1. CHALLENGES AND ISSUES

Inputs	Production	Harvest	Markets & Logistics
Unapproved/ uncertified varieties	Fail to meet Demand annually because of limited capacity.	Post-Harvest Losses up to 20%	Poor marketing infrastructure
Lack of institutional support to provide database and inventorying of certified, disease-free seed plants.	Old outdated orchard management practices	Quality assurance mechanisms and standardized	Lack of marketing campaign for local consumption
Unreliable supply of certified plants.	No disease-free zones were identified for new plantation	The existing capacity of frozen juice is low	Marketing/trading Citrus under one brand from Pakistan as a premium product
Lack of registered nurseries	No standardized curriculum for orchard management	Increase the life of the product to improve exportability	Lack of market research/ market identification
Poor nursery management practices	Reduced shelf life of fresh fruits	Lack of modern technology	Poor access to the high-end market
Inadequate supply of plants required for new zones.	Food safety issues	Low and inadequate quality of existing storage facilities	Lack of presence at international exhibitions/ trade shows
Inefficient Irrigation systems	Spread of diseases	Low automation	Inadequate and scarcity of existing facilities for Grading, Polishing, and sizing for local market demands.
	Low Price	Labor expenses	
	Lack of extension Services and technical assistant		
	Poor pest/disease management		
	Imbalance uses of Nutrition		
	Intercropping		

10.6.2. RECOMMENDATIONS

Inputs	Farms Management & Zoning	Marketing & Access to Finance
CRI to develop new seed varieties	Farm Mechanization	Developing state-of-the-art Cold-Storage
DNA & all other required testing are for mother plant and scion varieties	Develop Standardized Manual on Citrus Orchard Management practices	Improved local markets, & international linkages
Identify protocol for export of citrus to the various markets.	Declare Citrus emergency to enforce the adoption of standardized manual practices	Provide an incentive for setting up new industries
Upgradation of CRI and capacity building of their staff	Develop 75,000 acres (through EMFP) on improved orchard management practices to target the export market	Develop local manufacturing industry to manufacture Grading/Sorting/Packing lines
Linkages with academia and international researchers for R&D	Awareness and training of farmers on standardized orchard management and improved irrigation practices	Develop concerted media campaign for increasing consumption of citrus products
Survey of nurseries to identify capacity to produce/ multiply disease-free plants	Provision of extension services	Develop zoning-based state-of-the-art citrus trading market
Timely availability of water and other inputs		Identification of demand in the international and local market
		On-going varietal development based on market research

10.7 GARLIC VALUE CHAIN

Garlic is the second most widely used cultivated allium after onion. It has long been recognized all over the world as a valuable spice for foods and a popular remedy for various ailments and physiological disorders. Garlic is considered a rich source of carbohydrates, protein, phosphorous. Ascorbic acid content was reported to be very high in green garlic. Nutritive composition of fresh peeled garlic and dehydrated garlic powder. The composition of blub is given as water 84.09%, organic matter 13.38%, and inorganic matter 1.53% that of the leaves in water 87.14%, organic matter11.27%, and inorganic matter 1.59%.

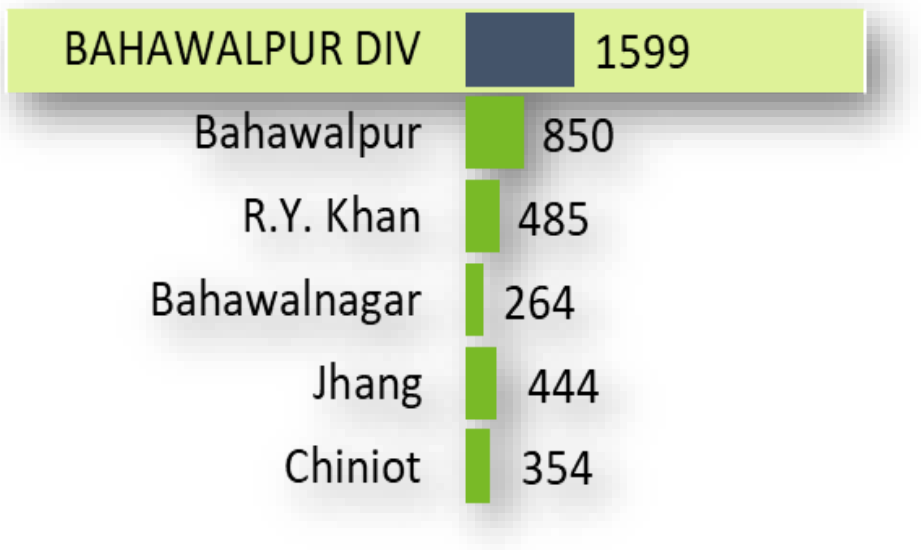


Figure 35: **PUNJAB PRODUCTION (TONNES)**

Source: Crop Reporting Service

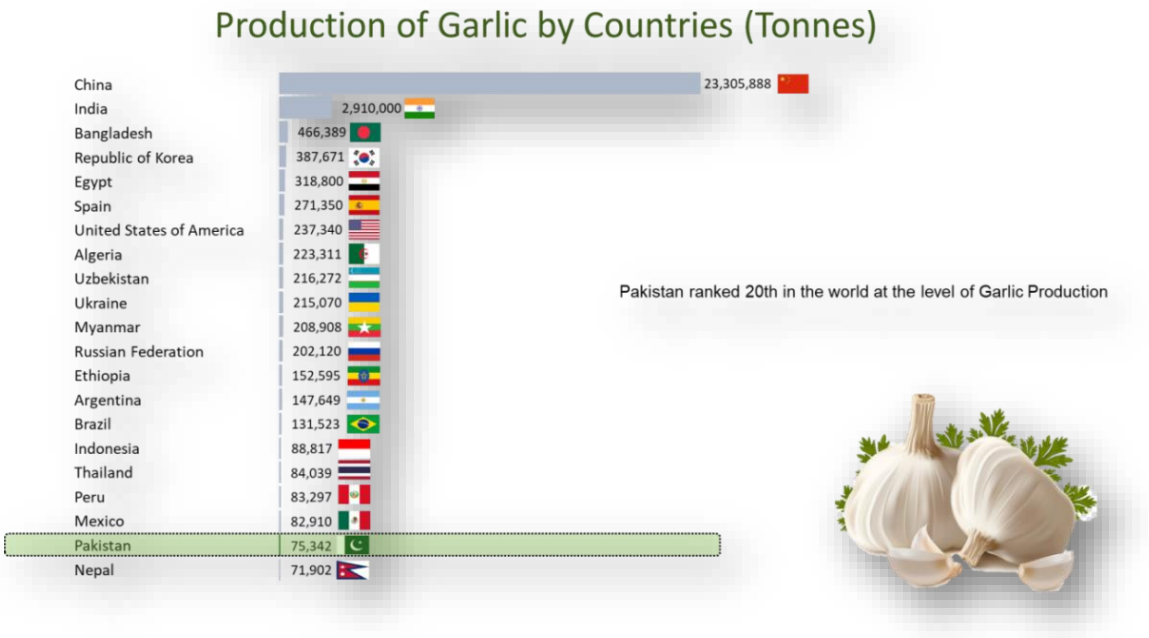


Figure 36: **GARLIC PRODUCTION**

Source: FAO

In 2020, Pakistan was ranked 32nd with a share in export of **≈ 0.0%**. In terms of imports 2020, Pakistan was ranked 6th with a share of 3.41%. In 2019, Pakistan was ranked 20th with a share in the production of 0.25%.

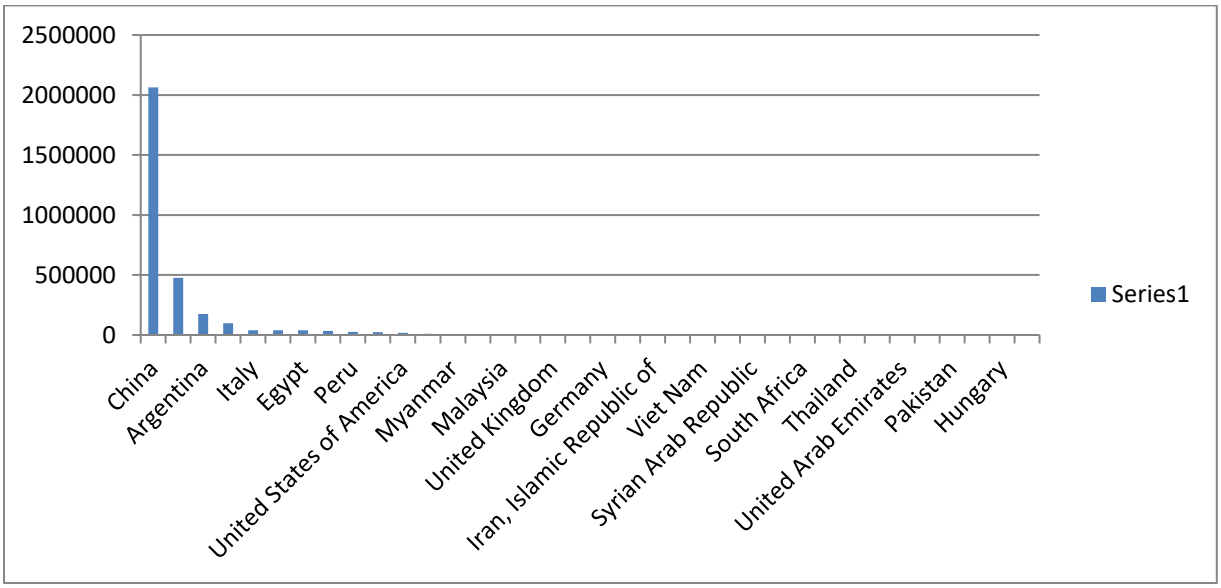


Figure 37: **GARLIC EXPORTS**

Source: Trade Map

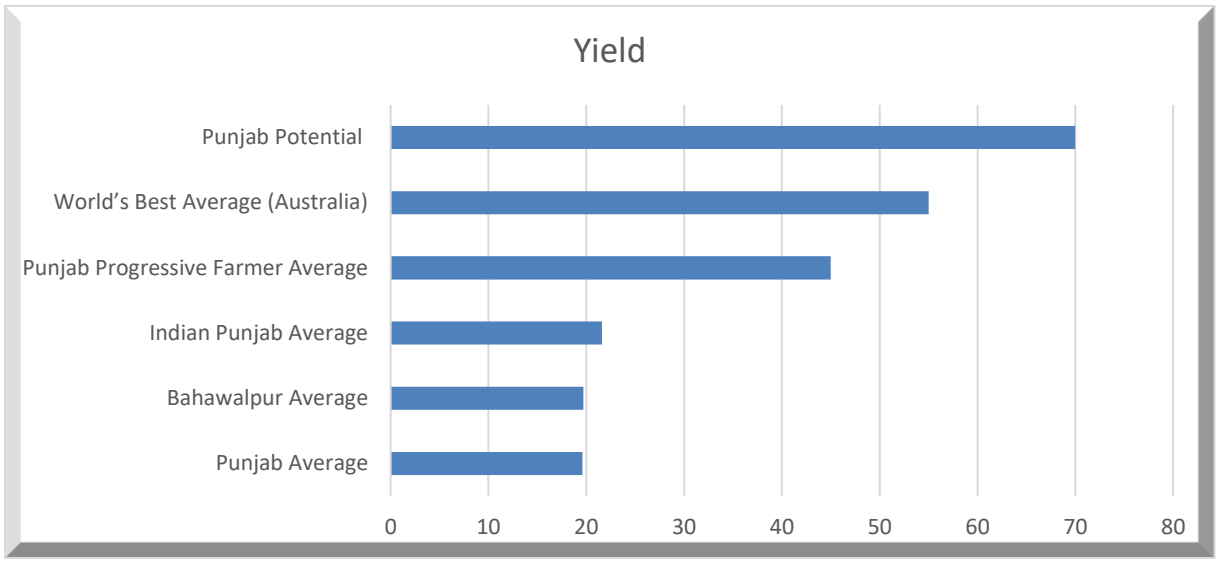


Figure 38: **GARLIC YIELD**

Source: Agriculture Policy (2018)

10.7.1. CHALLENGES AND ISSUES

Inputs	Production	Harvest	Markets & Logistics
Limited availability of certified seed Non-availability of appropriate quality fertilizer Declining organic matter in soils No locally Produced Cheap seed available in the market Flooded irrigation deteriorates Garlic quality Limited availability of HYV and pest and disease-resistant varieties.	Lack of knowledge of Persistent Organic Pollutant (PoP) & Good Agricultural Practices (GAP) for Garlic production. Lack of farm mechanization for planting and harvesting increases the cost of production and reduces competitiveness in the international market Lack of extension Services and technical assistant Poor pest/disease management Inefficient use of fertilizers and pesticides	Traditional harvesting techniques Unavailability or expensive machinery Quality assurance mechanisms and standardized certifications for export are missing. Limited value addition opportunities Lack of modern technology Low and inadequate quality of existing storage facilities Shortage and Expensive labor	Auctioning in the wholesale market with visual and spot grading Lack of market information regarding prevailing prices, arrivals, etc., which force farmers to sell in village locally. Inadequate infrastructural facilities like storage with producers, traders, processors, and at the market level, which result in marketing inefficiencies. Fail to meet Demand annually because of limited capacity. Limited primary and secondary processing units and byproducts such as pealing/ paste units.

10.7.2. RECOMMENDATIONS

Inputs	Farms Management & Zoning	Marketing & Access to Finance
Development of Certified Seed (Pre basic, basic, and multiplication) to the Farmer of Garlic. Local garlic seed varieties replacement program. Provision of inputs (Fertilizer, Pesticides, and Implements) on subsidy to develop garlic cluster. Provision of specialized extension services for vegetable crops. Survey of nurseries to identify capacity to produce/ multiply disease-free plants Provision of extension services On-going varietal development based on market research	Capacity building and specialized labor for garlic harvesting. Availability of skilled and trained labor Farm Mechanization Awareness and training of farmers on standardized garlic farming management and improved irrigation practices	Linkages with academia and international researchers for R&D Improved local markets, & international linkages Establishment of Garlic powder and paste production unit. Establishment of garlic market in garlic cluster. Training of labor on Grading, Sorting, Packaging, usage of processing equipment

11. LIVESTOCK VALUE CHAIN

The growing population, economy, and rising demands for livestock products in both the domestic and international markets put a strain on the domestic supply of livestock and its products. Animal farming has a comparative advantage in terms of production because of its conducive atmosphere for raising livestock. This advantage is most noticeable in farms located near urban centers, which have been successful in establishing better value chains than farms in Pakistan's rural areas. There is widespread agreement among livestock stakeholders that serious efforts are required on the part of both the government and the private sector to develop policies, implement them, and launch-related initiatives that would allow both rural and urban areas to enjoy better prospects for the growth of livestock and livestock products by establishing an organized and well-coordinated value chain.

11.1 MEAT VALUE CHAIN

The meat value chain in Pakistan may be divided into five segments namely;

a. Inputs used in the breeding of the livestock

b. Breeding of live animals meant for procuring meat and meat products

c. Marketing of animals bred for obtaining meat and meat products

d. Processing of meat products and value addition

e. Marketing of meat in

- Domestic market
- International markets

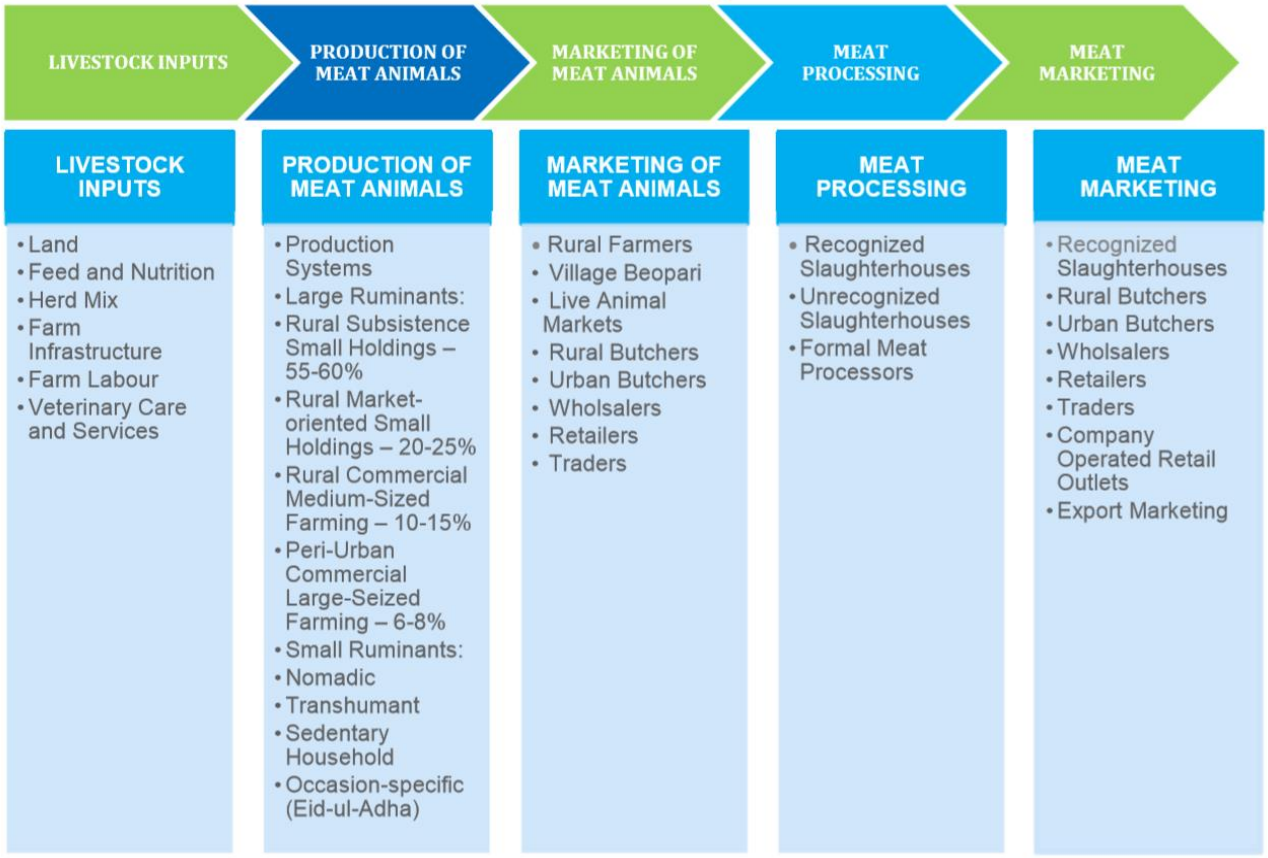


Figure 39: **MEAT VALUE CHAIN**

Source: Trade-Related Technical Assistance (TRTA II) Programme

11.2 DAIRY VALUE CHAIN

Liquid milk, flavored milk, yogurt, powdered milk, lassi (sour milk), butter, desi ghee, ice cream cheese, sweets and bakery items, and khoya are among the various types of milk and milk products sold in Pakistan (sweetened condensed milk pastry). Pakistan has a massive domestic milk market, and despite being the world's fourth-largest milk producer, the nation is a net importer, filling the gap between demand and supply with powdered milk imports. Processors account for 3-4 percent of total milk production in Pakistan and manufacture various types of milk, primarily UHT milk, condensed milk, and skimmed milk.

The Pakistan Dairy Development Company highlighted the growing demand-supply gap of 3.6 billion liters in 2015. According to Saud Pasha, Director Agri. Business Services at Engro Foods, supply is growing at a 5% rate while demand is growing at a 15% rate, resulting in large gaps in the demand-supply equation.

The issue is low productivity, with Pakistan's yields per animal in 2011-12 standing at 3.15 liters per animal. According to Ministry of Food Security and Research projections, raw milk production will be 48 billion liters from an estimated 55 million milking animals out of a total cattle and buffalo population of nearly 70 million, assuming 70% lactating animals (other being dry). Lactation yields for cows ranged from 450 liters in barani (rain-fed areas) to 1800 liters in peri-urban farms. Similarly, progressive farms achieve lactation yields of up to 2500 liters. The vast differences in milk yields per animal between Pakistan and advanced countries such as Israel, Australia, New Zealand, and the United States highlight the fact that greater production efficiencies, rather than large herd sizes, are unquestionably the way forward.

Pakistan's livestock population, out of which a majority is in Punjab, needs an extended framework for Bahawalpur Division. A rapid investigation of livestock value chains has been identified which will lead to help meet the saving mechanism as proposed under the project interventions.

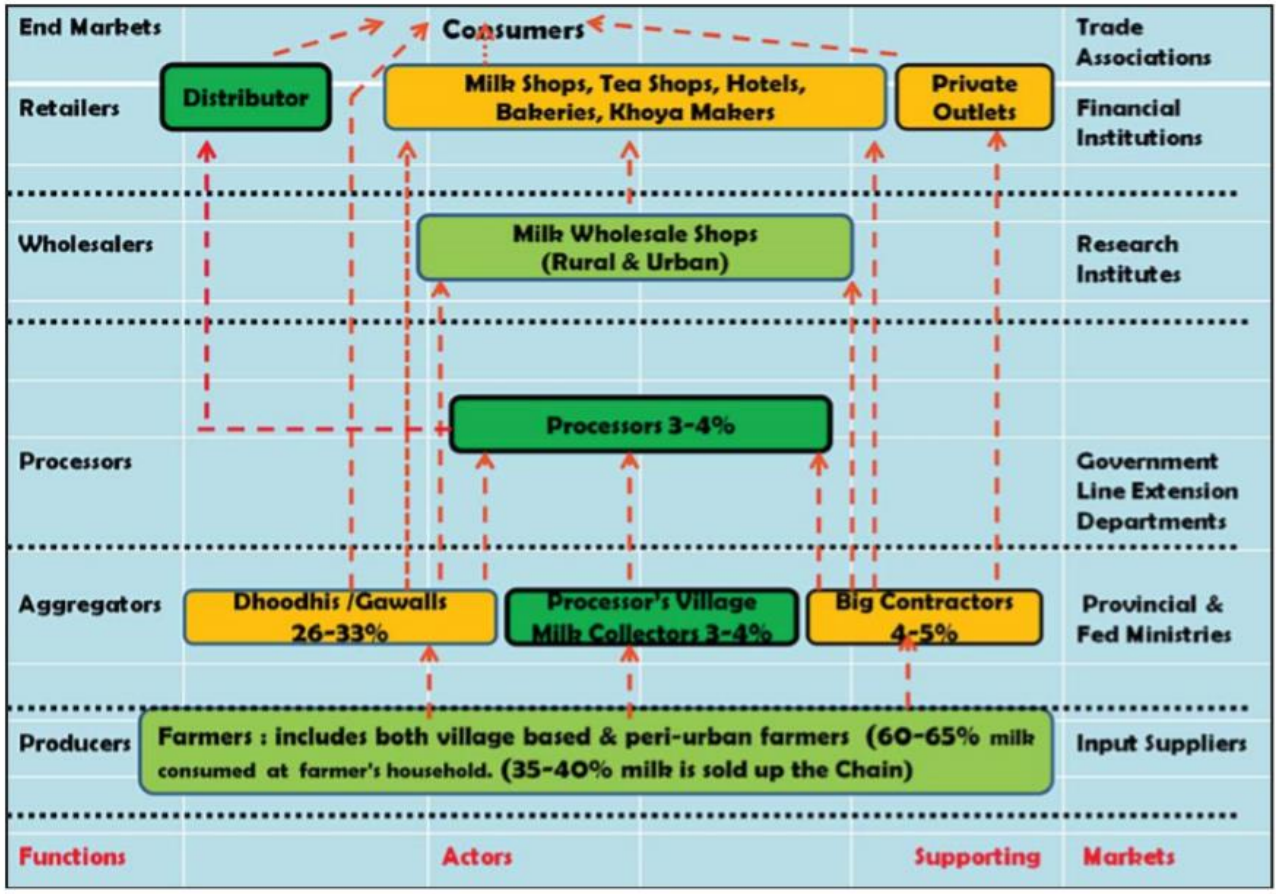


Figure 40: **PAKISTAN'S DAIRY VALUE CHAIN**

Source: Agriculture Credit and Microfinance Department, SBP

12. KEY INTERVENTIONS FOR THE REGION

The urban unit recognizes that some important interventions need to be addressed on short, medium, and long-term project scales.

PROJECT SCALE	INTERVENTIONS	DESCRIPTION	STATUS	TENTATIVE COST IN MILLION PKR
CROPS				
Cotton				
SHORT-TERM PROJECTS	Cottonseed replacement program	Need to increase the scale to integrate the existing quality seed production (Currently allocated 350M)	On-going Project	220
	Introduction of IPM practices for effective insect/pest control in the area.		New Project	200
	Ease of financial access and insurance bundle services along with fin-tech services for the provision of credit.		New Project	300
	Provision of fertilizer and pesticide.		New Project	982
	Conduct market surveys to identify demand in international and local markets.		New Project	100
MEDIUM-TERM PROJECTS	Introduction of production technologies and implements keeping in view the climate change.	Mechanization to increase productivity needs to be integrated to increase the scale (Currently allocated 1132M)	On-going Project	360
	Up-gradation of Seed grading and processing facilities.		New Project	300
	Establishment of Foundation seed cell to strengthen the seed production facilities		New Project	
LONG-TERM PROJECTS	Introduction of high-yielding cotton varieties compatible with local conditions.		New Project	250
	Development of Ginning cotton industry in Bahawalnagar		New Project	1000

	district.			
	Development of Spinning cotton industry in Bahawalpur Division.		New Project	1000
Garlic				
SHORT-TERM PROJECTS	Local garlic seed varieties replacement program.		New Project	314
	Provision of inputs (Fertilizer, Pesticides, and Implements) on subsidy to develop garlic cluster.		New Project	171
	Capacity building of labor for garlic harvesting.		New Project	150
MEDIUM-TERM PROJECTS	Development of Certified Seed (Pre basic, basic, and multiplication) to the Farmer of Garlic.	Need to increase the scale to integrate the existing quality seed production (Currently allocated 350M)	On-Going Project	200
	Establishment of garlic market in garlic cluster.		New Project	200
	Establishment of Garlic powder and paste production unit.		New Project	60
Sugarcane Zone				
SHORT-TERM PROJECTS	Cost Sharing on Sugarcane Implements (Chisel Plough, Early hill up implement, Sugarcane Planter, Granular Pesticide Applicator).		On-going Project	120
MEDIUM-TERM PROJECTS	Showcasing of Good Agricultural Practices (GAP) on balanced use of fertilizer, Weedicide application, and Integrated Crop Management (ICM) by Public-private partnership to establish demonstration plots.		On-going Project	30
	Promotion of water-saving technologies for sugarcane production e.g. planting on beds, pit planting, etc. to curtail the growing menace of waterlogging.	Mechanization to increase productivity needs to be integrated to increase the scale (Currently allocated 1132M)	On-going Project	300
	Promotion of Intercropping, September Planting, and Chip Bud Technology [Strengthening of Bio-labs for development of Integrated Pest Management program (IPM)].		On-going Project	20
LONG-TERM PROJECTS	Development of climate-smart high-yielding varieties.		New Project	200
	Sugarcane value addition enhancement program.		On-going Project	200
Wheat				

SHORT-TERM PROJECTS	Subsidy on gypsum & green manuring		On-going Project	1117
	Subsidy on implements for wheat		New Project	900
	Subsidy for Seed Replacement Program.	Need to increase the scale to integrate the existing quality seed production (Currently allocated 350M)	On-going Project	1300
	Subsidy on weedicide		New Project	1200
MEDIUM-TERM PROJECTS	Development of Smart tools for mechanization especially for small farmers.	Mechanization to increase productivity needs to be integrated to increase the scale (Currently allocated 1132M)	On-going Project	1000
	Special program for the Seed Companies for Wheat Seed Production.		On-going Project	700
LONG-TERM PROJECTS	Climate Smart breeding program (Rebreeding, Hybridization, and innovative technologies for various zones: Rust and heat stress-tolerant varieties, Spring Wheat, Durum Wheat, Triticale, etc.).		On-going Project	500
Citrus				
SHORT-TERM PROJECTS	Database of new plants/ plantation according to zoning and identification of new disease-free areas for new varieties of citrus		New Project	250
	Conduct market survey to identify demand in the international and local market for Kinnow and other varieties and identify a protocol for export of citrus to the various markets & conduct survey of registered nurseries. All nurseries to be given targets to produce 20 million plants & monitor them.		New Project	200
	DNA & all other required testings for mother plant and scion varieties (annual indexing, monitoring mechanism, track report) for citrus.		On-going Project	1000
	Provision of subsidy on weedicide and pesticide		New Project	400
MEDIUM-TERM PROJECTS	Establishment of Citrus processing unit		New Project	320
	Establishment of Cold storage		New Project	600
	Installation of High-Efficiency Irrigation Systems (HEISs) on new Plantations		On-going Project	2000
LONG-TERM	Up-gradation of CRI to develop 1 million certified plants/annum		On-going	350

PROJECTS	of existing & new varieties.		Project	
	Establishment of Citrus juice processing unit		New Project	200
Grapes				
SHORT-TERM PROJECTS	Provision of subsidies till the maturity of the Orchards		New Project	262
	Training and capacity building in production technologies for cultivation of Grapes Orchards		New Project	150
MEDIUM-TERM PROJECTS	Provision of rootstock/scions of suitable varieties of Grapes by establishing nurseries.		New Project	200
	Establishment of processing units in Bahawalpur District		New Project	20
Chillies				
SHORT-TERM PROJECTS	Training of farmers in cultivation, harvesting, packing, and storage of these crops.	Need to increase the scale to integrate the extension services (Currently allocated 350M)	On-going Project	150
	Provision of inputs (Fertilizer, Pesticides, and Implements) on subsidy to develop chilies cluster.		New Project	196
MEDIUM-TERM PROJECTS	Establishment of chilies market in its cluster.		New Project	200
	Establishment of the chilies processing unit (dry chili, hot sauce & chili powder).		New Project	50
LONG-TERM PROJECTS	Development of hybrid chilies varieties and cultivation under controlled environment.		On-going Project	300
Tomatoes				
SHORT-TERM PROJECTS	Local tomato seed varieties replacement program.	Need to increase the scale to integrate the existing quality seed production (Currently allocated 350M)	On-going Project	300
	Provision of inputs (Fertilizer, Pesticides, and Implements) on subsidy to develop tomato cluster.		New Project	696
MEDIUM-TERM PROJECTS	Establishment of Tomato paste production unit		New Project	200
	Establishment of CA (Control Atmosphere) storage		New Project	180
	Establishment of tomato market in tomato cluster.		New Project	200
LONG-TERM PROJECTS	Development of Certified Seed (Pre basic, basic, and multiplication) to the Farmer of Tomato.	Need to increase the scale	On-going Project	300

Mango				
SHORT-TERM PROJECTS	Training program on plant protection, Harvesting, packing, and processing of mango		New Project	250
MEDIUM-TERM PROJECTS	Cultivation of Mango on High-density Planting under Drip Irrigation in new areas.		New Project	975
	Capacity Building of farmers on GAP to meet international standards and certifications		New Project	200
	Establish/ update Cold Storage/Controlled atmosphere facilities for local and international market/ mandi to increase shelf life.		New Project	600
	Develop new varietal characteristics in terms of shelf life, robustness in handling, and ability to withstand phytosanitary treatments (HWT, VHT, or irradiation) to target high-end markets.		On-going project	450
	Establishment of Mango Research Station		New Project	
Rapeseed and Sunflower				
SHORT-TERM PROJECTS	Provide high-quality seed.		New Project	250
	Ensure Hybrid Seed Availability through National and Multinational Seed Companies.		New Project	300
	Arrange seminars at the district level in core oilseed districts to create awareness about best management practices/production technology for selected crops during Rabi and Kharif season.		New Project	150
	Subsidy on inputs to increase production of oilseed crop.		New Project	533
	Provision of Support price till market development.		New Project	150
	Appreciation of best growers on provincial and district levels.		New Project	150
	Quality Seed Production Program	Need to increase the scale to integrate the existing quality seed production (Currently allocated 350M)	On-going Project	
MEDIUM-TERM PROJECTS	Promote mechanization for oilseed crops to minimize post-harvest losses and get good yields.	Need to increase the scale (Currently allocated 1132M)	On-going Project	160
	Oil extraction units in clusters.		New Project	600
LONG-TERM PROJECTS	Address low yields of oilseed crops by enhancing production both vertically and horizontally.		New Project	160
	Establishment of state-of-the-art oilseed market.		New Project	300

Medicinal Plants				
MEDIUM-TERM PROJECTS	Training and Capacity Building of collectors of Medicinal plants by involving Islamia University, Bahawalpur who has performed a lot of research in this regard.	Need to increase the scale	On-Going Project	200
	Promotion for the domestication of wild species having medicinal value and their production on a commercial scale as the climate is highly suitable for the production of these species	Need to increase the scale	On-Going Project	200
	Establishment of processing facilities of Medicinal plants by engaging private institutions like Hamdard and Qarshi Industries	Need to increase the scale	On-Going Project	150
	Establishment of Markets for the trading of Medicinal plant/raw materials and Herbal products in each district	Need to increase the scale	On-Going Project	200
Expansion of Area under Maize for fodder				
SHORT-TERM PROJECTS	Training of farmers in mechanical harvesting of maize.		New Project	200
	Capacity building of farmers in maize, production technologies, and preparation of silage.		New Project	150
	Exchange and Development of fodder Germplasm resistant to biotic and abiotic stresses	Currently allocated 33.333 Million	On-going	
LIVESTOCK				
Breed Improvement				
MEDIUM-TERM PROJECTS	**Establishment of A2 Genotyping Facility at Quality Control Lab and Genetic Characterization of Cholistani and Sahiwal Cattle Breed**		On-going project	40
	Maintenance of nucleus herds of superior germplasm of local livestock breeds		New Project	170
	Establishment of sub-centers in Districts for registration of Livestock with following activities		New Project	900
		a) Registration of Sahiwal/Cholistani cows and Nili Ravi Buffaloes		
		b) Performance recording of private cows		
		c) Identification of		

		Nucleus herds of Cattle and Buffalo		
		d) Evaluation of Institutional and Private herds		
		e) Conduction of research trials		
		f) Purchase of Sahiwal and Cholistani bull calves		
	Enhancement of Livestock Production through the provision of effective and continued services to the Livestock owners for better maintaining of dairy animals, Sheep, Goats, and Poultry		New Project	300
LONG-TERM PROJECTS	Conserving the local potential Breeds through genetic improvement and management		New Project	532
Nutrition and Upgrading farm				
MEDIUM-TERM PROJECTS	Multiplication / Propagation of High Yielding Multi-cut Exotic Grasses to enhance Livestock Production & Nutrition		On-going Project	300
Disease Control and Prevention				
MEDIUM-TERM PROJECTS	Establishment of ISO certification and Accreditation of Quality Control Lab (QCL)		New Project	140
	Enhancement of vaccine production for Livestock & Poultry.		New Project	350
LONG-TERM PROJECTS	Establishment of Research Center for Molecular investigations of field strains of the FMD, HS, ETV, PPR, Mycoplasma, Brucella, ND, and Avian Influenza.		On-going Project	250
	Establishing technical route epidemiological survey, compulsory immunization, barrier system for controlling livestock movement from high-risk area to disease-free zone, monitoring & warning and quarantine supervision and emergency treatment and disease-free certification system.		New Project	1200
Extension Services				
MEDIUM-TERM PROJECTS	Establishment of New Civil Veterinary Dispensaries at union council level		New Project	800
	Livestock based integrated farming systems for the		New Project	400

	improvement of small and marginal farmers			
	Farmer's training and gender mobilization for production enhancement and genetic improvement in the livestock sector		New Project	300
	Strengthening of Disease Diagnosis, Reporting, Surveillance System and ISO Certification of Provincial Diagnostic Labs		New Project	500
LONG-TERM PROJECTS	Strengthening of veterinary & extension services in deprived Union Councils, through the establishment of Veterinary Institutions.		New Project	400
Technological Development				
SHORT-TERM PROJECTS	Demonstration of Best Farm Management Practices to the technical personnel, extension workers, and farmers to improve the production potential of their animals.		New Project	400
MEDIUM-TERM PROJECTS	Establishment of Model Livestock Farms for buffalo & Cattle.		On-going Project	900
	Establishment of the center for certification of halal meat.		New Project	400
	Construction of Cattle shoots.		New Project	300
LONG-TERM PROJECTS	Establishment of R&D for processing units to enhance value addition.		On-going Project	200
	Establishment of Camel (Marecha Breed), Sheep (Khadali Breed), and Goat (Jattal Breed) research center.		New Project	300
	Production Enhancement through Rehabilitation & Modernization of Livestock Farms		New Project	250
Bilateral trade and investment				
SHORT-TERM PROJECTS	Establishment of Slaughterhouse.		New Project	800
	Establishment of Cattle Mandi.		New Project	1000
MEDIUM-TERM PROJECTS	Construction of State of the art Livestock Business Complex with special desk for export support.		New Project	500
	Development of cold chain resources for meat and milk storage and transportation of vaccines.		New Project	250
WATER EFFICIENCY				
Improve Water Efficiency				
SHORT-TERM PROJECTS	**Climate Smart Water Management and Information Services**		New Project	304
		Development of a		

		Water Accounting System		
		Development of an Evapotranspiration-based Water Management System		
		Development of an Early Warning System		
		Provision of Information and Data to Facilitate Climate Change Adaptation		
	Provision of 400 LASER land levelers to the farmers/ service providers for strengthening LASER land leveling services in the private sector.		On-going Project	400
MEDIUM-TERM PROJECTS	**Building on-Farm Resilience to Climate Change**	Development of practices for a climate change resilient	New Project	348
		Training of extension workers and farmer facilitators		
	Establishment of Technology Transfer Centers (TTCs) in Bahawalpur Division for the demonstration to enhance water use efficiency through;	Farm layout planning/ designing, precision / LASER land leveling, and water budgeting & accounting.	On-going Project	655
		Provision of rapid soil testing kits to the farmers at TTCs for application of balanced fertilizer.	On-going Project	
		Fixation of pipe nakkas according to soil type and		

		water flow for channelized stream flows.		
		Installation of flow measurement devices for open channels and tubewells for measuring the discharge of water for water accounting.		
		Installation of soil moisture monitoring gadgets.		
		Application of Alternate Wetting & Drying (AWD) and Direct Seeding Rice (DSR) water-saving techniques in rice fields to increase water productivity.	On-going Project	
	The additional lining of 4722 partially improved up to 50% of the length and outlived watercourses to harness the potential of watercourse improvement.		On-going Project	6000
	Construction of on-farm water storage ponds in irrigated areas for storing excess canal/ rainwater for supplemental irrigation.		On-going Project	6825
	Install solar systems for operating high-efficiency irrigation systems.		On-going Project	630
	Support farmers for the installation of tunnels for off-season vegetable production.		New Project	210
	Deliver soil moisture to the farmers/ service providers.		New Project	
LONG-TERM PROJECTS	Improvement of 1707 unimproved watercourses up to 50% of total length for enhancing conveyance efficiency.	Need to increase the scale	On-going (Currently allocated 1794.395 M)	4178
	Promote high-efficiency irrigation systems on Drip and Sprinkle Irrigation System on fruit and vegetable farms.	Need to increase the scale	On-going (Currently allocated 338.873 M))	871

COMMON STRUCTURAL PROGRAMS				
MEDIUM-TERM PROJECTS	Provision of specialized extension services for vegetable crops.	Need to increase the scale	On-going	300
	Provision of specialized extension services for fruits.	Need to increase the scale	On-going	300
	Ease of financial access and insurance services to farmers.		New Project	300
	Up-gradation and establishment of agriculture markets.		On-going	500
	Establishment of feed mills.		New Project	300
	Set up of support system for the farmers in case of crop failure and price fluctuation for vegetables and fruit crops.		New Project	500
LONG-TERM PROJECTS	Establishment of state-of-the-art warehouses and grain silos.		New Project	300
	Provision of missing infrastructure in Agriculture produces markets.	Currently allocated 108.529 Million	On-going	
	TOTAL ESTIMATED COST			**63249**

INDUSTRIAL DEVELOPMENT PLAN

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ACRONYM

AIP	Agro-Industrial Park
BCCI	Bahawalpur Chamber of Commerce & Industries
CC	Crop Clusters
CCA	Certificate in Computer Applications
CETP	Combined Effluent Treatment Plant
CGSD&P	Credit Guarantee Scheme for Development and Promotion
CNC	Computerized Numerical Control
CPEC	China-Pakistan Economics Corridor
CTC	Cluster Transformation Centers
DAE	Diploma of Associate Engineering
EEI	Entrepreneurship Expansion Initiative
ESS	Entrepreneur Sustenance Scheme
FCI	Fixed Capital Investment
FPCs	Farmers Producer Company
FPO	Farmer Producer Organization
GCT	Government College of Technology
GTTI	Government Technical Training Institute
HVAC	Heating, Ventilation, And Air Conditioning
KLP	Karachi-Lahore-Peshawar Road
LMSP	Loan Markup Support Program
M&E	Monitoring & Evaluation

MNC's	Multinational Corporations
MSME	Micro Small & Medium Enterprises
N.E.C	Not Elsewhere Classified
PPED	Progressing Punjab By Entrepreneurial Development
PRS	Punjab Rozgar Scheme
PSIC	Punjab Small Industries Corporation
R&D	Research & Development
RCCI	Rahim -Yar Khan Chamber of Commerce & Industries
SMEs	Small & Medium Enterprises
SPHA	Support Program for Handicrafts Artisans
SWM	Solid Waste Management
SWOT	Strengths, Weaknesses, Opportunities and Threats
TEVTA	Technical Education and Vocational Training Authority
TVET	Technical and Vocational Education and Training
USD	U.S. Dollar
WAP	Working Age Population

DISCLAIMER

Urban Sector Planning and Management Sector Unit (Pvt.) Ltd. has prepared this report on the Industrial Development Plan of Bahawalpur Division. Maximum care and caution have been observed while developing this document.

The opinions expressed in the document are solely those of the authors and publishing in any way constitutes an endorsement of the opinion by the Urban Unit.

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Executive Summary

This report is a regional plan for industrial development for the Bahawalpur region. By providing an overview, the current industrial outlook has been discussed. Furthermore, based on this analysis through field visits and discussions with stakeholders' recommendations are suggested to establish a strong industrial base in the region. Bahawalpur is the largest region of Punjab in terms of area; it has three districts Bahawalpur, Bahawalnagar, and Rahim Yar Khan. Altogether, all three divisions have almost 985 operating firms. As per SWOT analysis, several laggings in the system have been identified such as labor quality, infrastructural weaknesses, and non-entrepreneurial culture. These problems have led to growth stagnating here. For economic transformation, it is necessary to address these issues and address them with the appropriate interventions through different schemes and programs. Therefore, it is suggested to initiate a few programs such as the establishment of business Incubation and Intelligence units, the establishment of the women resource center and incubators, providing missing facilities to TEVTA, and entrepreneur sustenance scheme to develop business culture amongst students will create an enabling environment for the development of MSME. Most importantly, Pakistan is an agrarian economy and for progress industrial transformation is a necessity. Thus, establishing an Agro-Industrial Park that will link both these sectors will lead to maximizing the utilization of resources and simultaneously boost overall productivity. This strategy will benefit all sectors of the economy, and regional differences can be expected to minimize.

1. Introduction

Integrated management of economic, physical, and social resources in a spatially confined area is referred to as regional planning (Johnson, 2015). This strategic implementation of plans and policies is an ancient practice. Moreover, this has been extended to civilized regions in the modern era. The logic that strengths this philosophy is that through regional planning complications in urban and environmental lagging can be addressed effectively (Lord & Tewdwr-Jones, 2015). Similarly, Wong (2015) explains visualizing the development of a city or a region in a spatial context is critical, and accounting for past and present association in planning and development can benefit the whole strategic process. Whereas, the central feature of the regional planning process is to benefit the community as a whole (Silva, 2015)

Economists usually divide the private sector into two segments i.e. households and businesses. Businesses are defined as an area of economic productivity and exchange. And within businesses, each productive unit is known as a firm (Cohen, 1979). These productive units combine to form an industry (Porter, 1980). The addition of a new firm can boost productivity via three main routes as follows: by elevating existing knowledge and technology; by introducing new technology, methods of production, or knowledge; or by enhancing regional capability by creating business opportunities and elevating the potential of overall industry (Martin, 2010; Tödtling and Trippl, 2013). However, the very initial performance of a firm in terms of job creation (Henrekson and Johansson, 2010) and economic outcomes (Alsos, Carter and Ljunggren, 2014) is supportive in predicting the future of regional development and can also help policymakers in devising relevant strategies or policies to attain anticipated trajectories (Rypestøl, 2017). Furthermore, the evidence reflects that regions with the presence of capital goods industry not only benefit the adaption but also create innovative production opportunities; these benefits are not limited to a particular zone but also lead to enhancements in corresponding regions (Pottier, 2015).

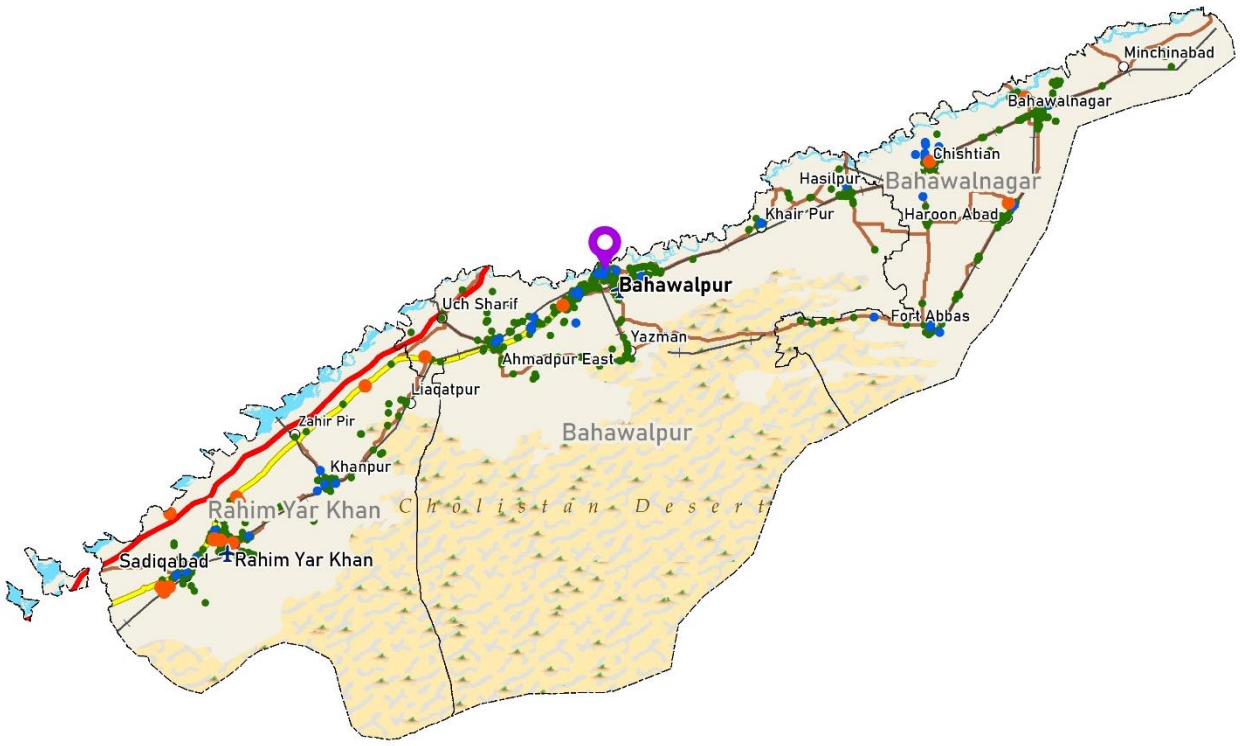
2. Industrial Landscape of Bahawalpur Region

Bahawalpur division is the second-lowest industrialized division in Punjab has a good spread of different industries in this region. Table 1 explains the total number of firms at each level of industry and employed individuals of this division. The food products industry has a maximum number of firms that industry has i.e. 482 with the highest capacity to provide employment opportunities of 13982. However, the non-metallic minerals industry has the second most number of firms and employment. Whereas, the potential of the chemical and chemical product industry is immense that is accommodating 6101 labor with only 24 firms.

The existing sector and firms depict that this region lack any competitive advantage in the production section, the existing units are not even enough to cater to the regional demand. Therefore, for the advancement of this region, the enhancement of capacity building in already established industries will benefit the local economy. Also, the introduction of innovative technology will not only increase its productivity but will lead to the development of contemporary skills in the labor force, which will lead to the basis of valuable human capital in this region.

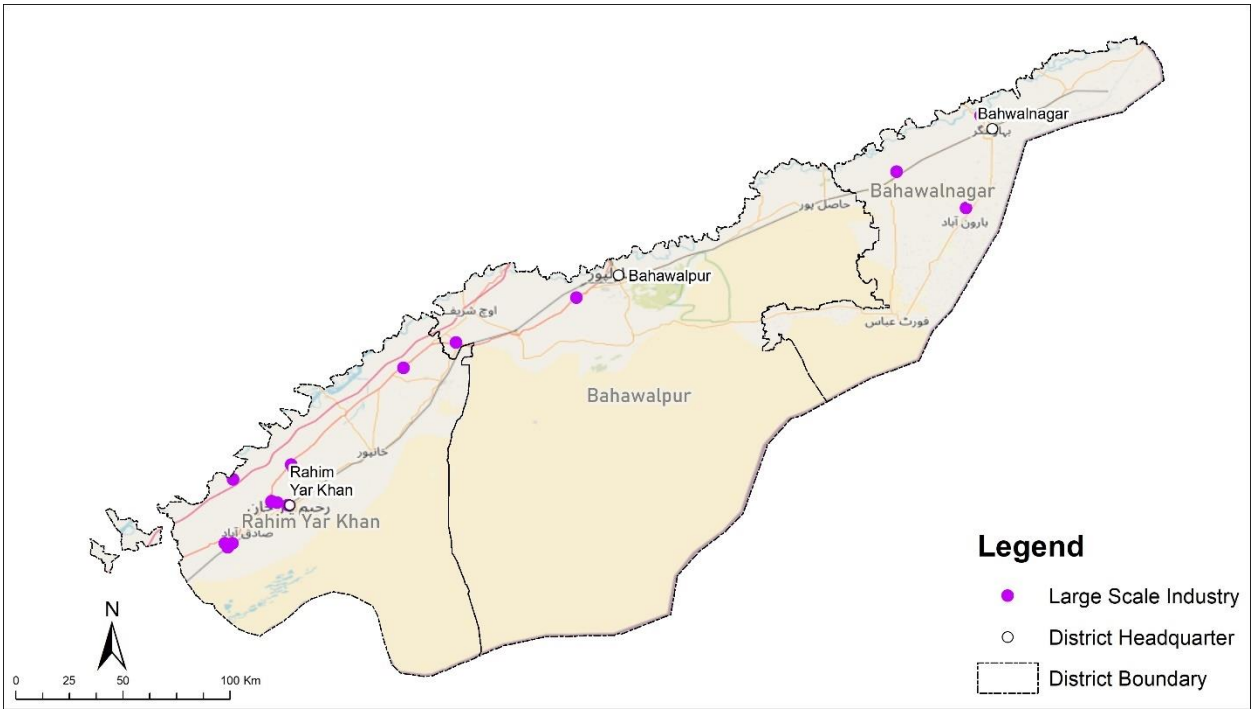
Table 1:Industrial Description of Bahawalpur Division

+Row Labels	Large	Medium	Small	Grand Total	Total Employs
Food Products	9	15	458	482	13982
Other Non-Metallic Mineral Products	-	30	274	304	7737
Furniture	-	-	55	55	505
Machinery and Equipment N.E.C	-	-	30	30	228
Fabricated Metal Products, Except Machinery and -Equipment	-	-	27	27	159
Chemicals and Chemical Products	3	1	20	24	6101
Textiles	4	1	14	19	2599
Beverages	1	-	9	10	430
Rubber and Plastics Products	-	2	7	9	423
Paper and Paper Products	-	-	4	4	79
Basic Metals	-	1	2	3	169
Basic Pharmaceutical Products and Pharmaceutical Preparations	-	1	2	3	154
Other Manufacturing	-	-	3	3	20
Other Transport Equipment	-	1	2	3	161
Electrical Equipment	-	1	1	2	263
Motor Vehicles, Trailers and Semi-Trailers	-	-	2	2	10
Printing and Reproduction of Recorded Media	-	-	2	2	10
Coke and Refined Petroleum Products	-	-	1	1	9
Tobacco Products	-	-	1	1	14
Wood and Of Products Of Wood And Cork, Except Furniture; Articles Of Straw And Plaiting Materials	-	-	1	1	8
Grand Total	**17**	**53**	**915**	**985**	**33061**



Map 1: Industrial spread in Bahawalpur Region

Map 1 of the Bahawalpur region that exhibitions spread of industries. A total of 1,034 industrial units out of 46, 357 in overall Punjab province are located here; which is only 2.4% of total industries and have only 5 exporting units. Whereas, map 2 is representing industries in Bahawalpur region with labor greater than 150.



Map 2: Large scale industry with employ greater than 150

2.1. Potential Clusters of the Region

Although there are not any defined clusters in the Bahawalpur region as in the case of other regions of Punjab; but there are indications of a few industries that can be developed into clusters to enhance their production level and compete at the national level. Therefore, cluster development and strengthen the existing industrial base is highly recommended in this region. To do this, it is essential to identify the industry that has the potential to develop as clusters, and the frequency of firms and employment opportunities that this specific industry is providing is necessary to consider. For instance, the food products industry is well-established in this region with 482 firms and benefits 13982 individuals in terms of employment; by analyzing it in a bit more detail it is accessed that large processing units have even more tendency. As we saw in the case of the sugar industry have that only exists in large-scale units and provides an opportunity to almost 13% of employees in this sector. Similarly, the fertilizers industry also has the potential to be developed as a cluster because it only has four processing units two on large-scale and the other two on small-scale, and is a source of employment for around 5438 individuals. Which is a healthy sign in relevance to other industries that have a higher number of units but provide lower employment opportunities. Therefore, a tactic approach for local economy encouragement will be to encourage these emerging industries.

2.2. Technological Potential

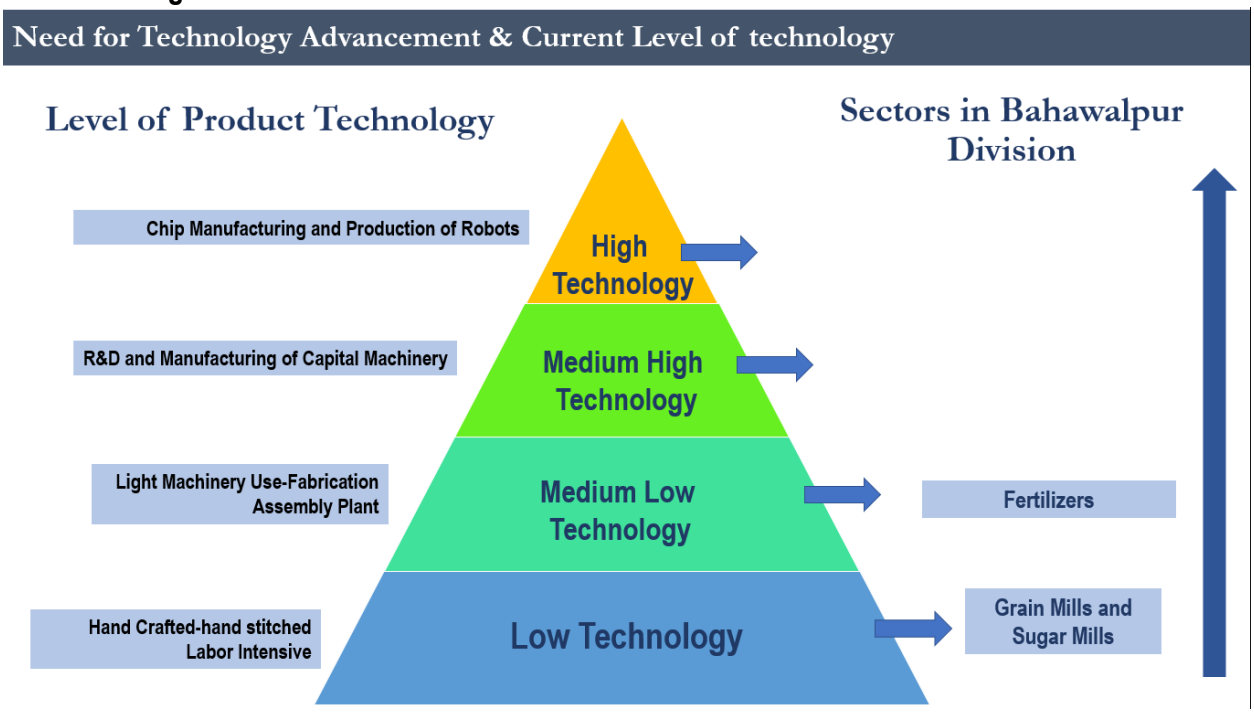


Figure 1: Technological Level of Industry in Bahawalpur Region

Generally, there are four levels of technology, that must be passed on to reach the highest level of development. This is displayed in a technological pyramid in Figure 1. The case of Bahawalpur is not different from other regions of Punjab, a very few fertilizers industries have access to medium-low technology; whereas grain and sugar mills are only capable of low technological production levels. And, this suggests that the industrial sector in this region is weak in agglomerations and not sufficient to form a baseline cluster. Therefore, to progress at a higher level of development, it is necessary to advance technologically. This technological progression will also be a supportive policy initiative in cluster development that will prepare industries for contemporary demand and competition.

2.3. Migration Trends:

Moreover, migration statistics from the Bahawalpur region depict a conceptual image. In the Bahawalpur district, around 73% of migrating population towards more economically prosperous areas such as Multan and Rawalpindi; or are adjacent to localities with better conditions. An example of this is the movement of individuals towards Lodhran which is not economically empowered itself but has close geographical linkages with Multan, an industrialized region; and around 20% of the migrating population is relocating in this city. The case for the Bahawalnagar district is similar, where outward migration is towards relatively better regions like Lahore and Multan. However, in the case of Rahim Yar Khan district, a major portion of the migrants is

towards the other district of the same region i.e. Bahawalpur district that can lead them to improved quality of life. Hence, it is concluded that the Bahawalpur region should be developed as per the requirements of residents so that they don't have to compromise social needs to attain a better living standard. Figures 2, 3, and 4 are representing outward migration statistics from all three districts of the Bahawalpur division.

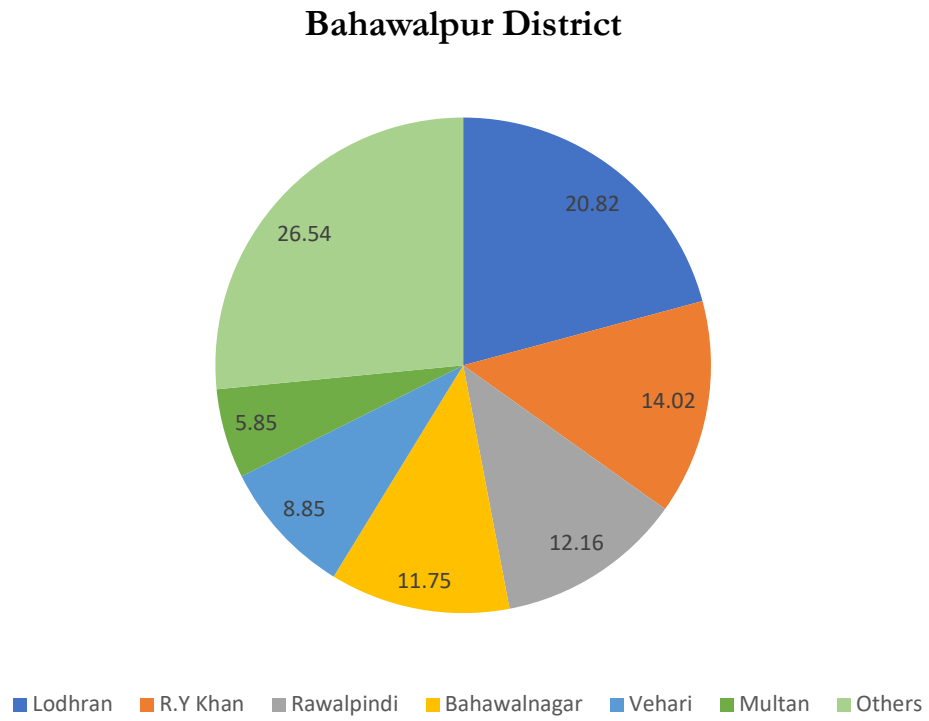


Figure 2: Bahawalpur District Outward Migration

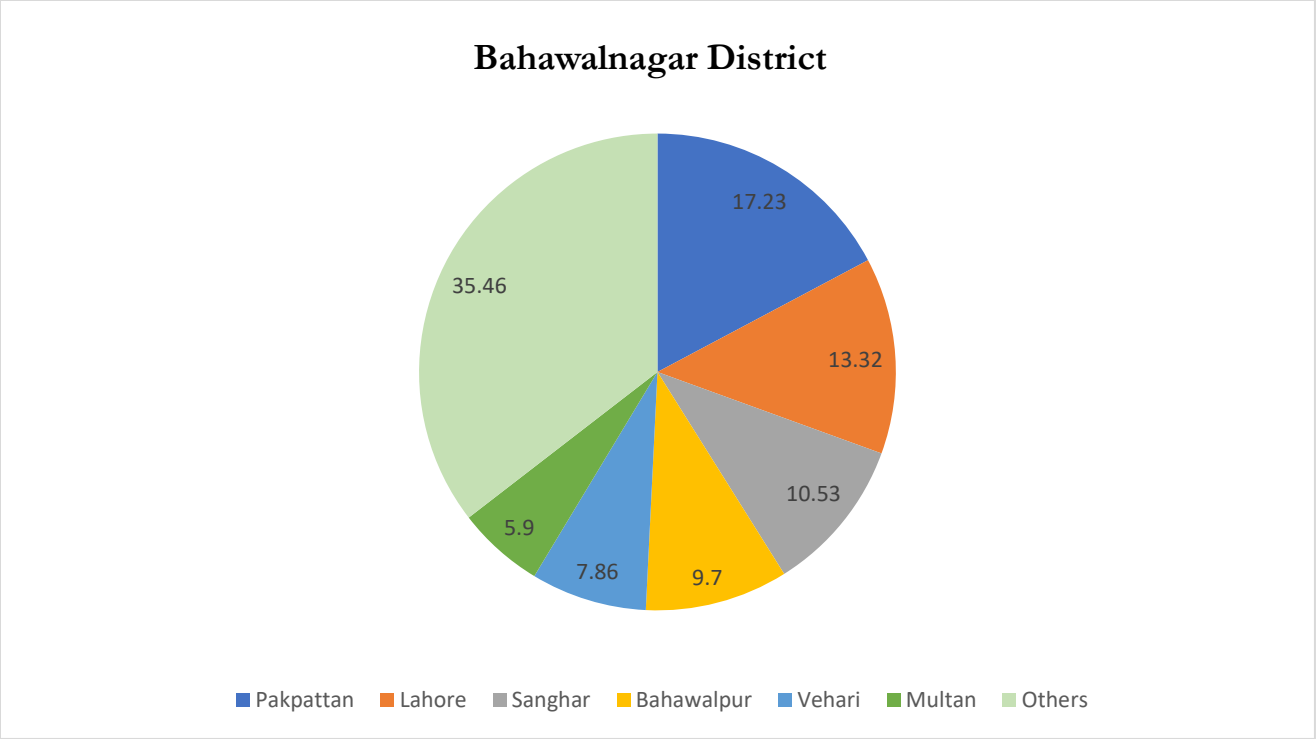


Figure 3:Bahawalnagar District Outward Migration

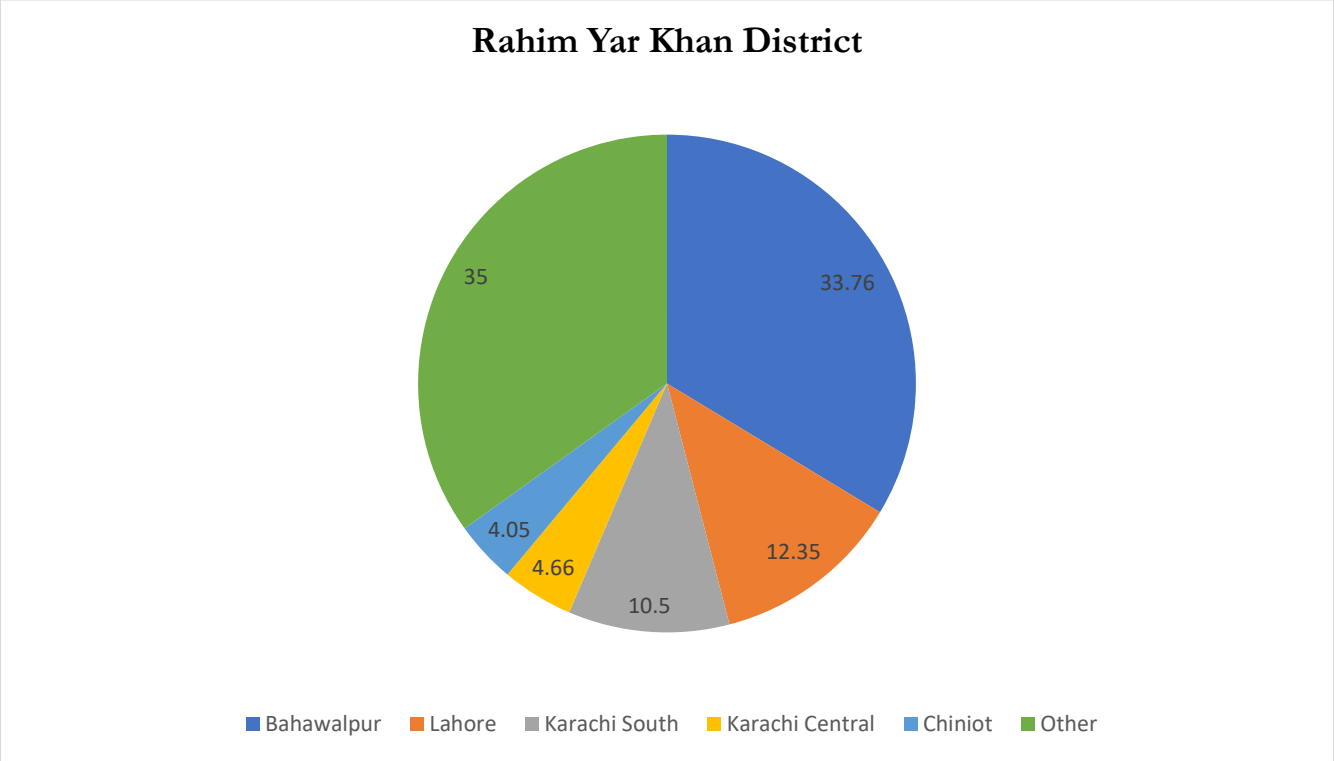


Figure 4: Rahim Yar Khan District Outward Migration

2.4. Situational Analysis-Rostow's Growth theory

According to Rostow's growth theory, a nation passes through 5 stages of development before it becomes fully matures or develops. These stages include traditional society, preconditions to takeoff, takeoff, drive to maturity, and age of high mass consumption. Currently, Bahawalpur is standing at level 2 of development. Therefore, there is a need for a set of interventions and programs to strengthen the existing base and attract new entrepreneurs. Similarly, hard and soft infrastructure along with institutional support and interventions for cost minimization to emerge as a competitive center of production are key requirements for progressing to the next stage. Figure 5 is an elaboration of Rostow's model for the Bahawalpur region.

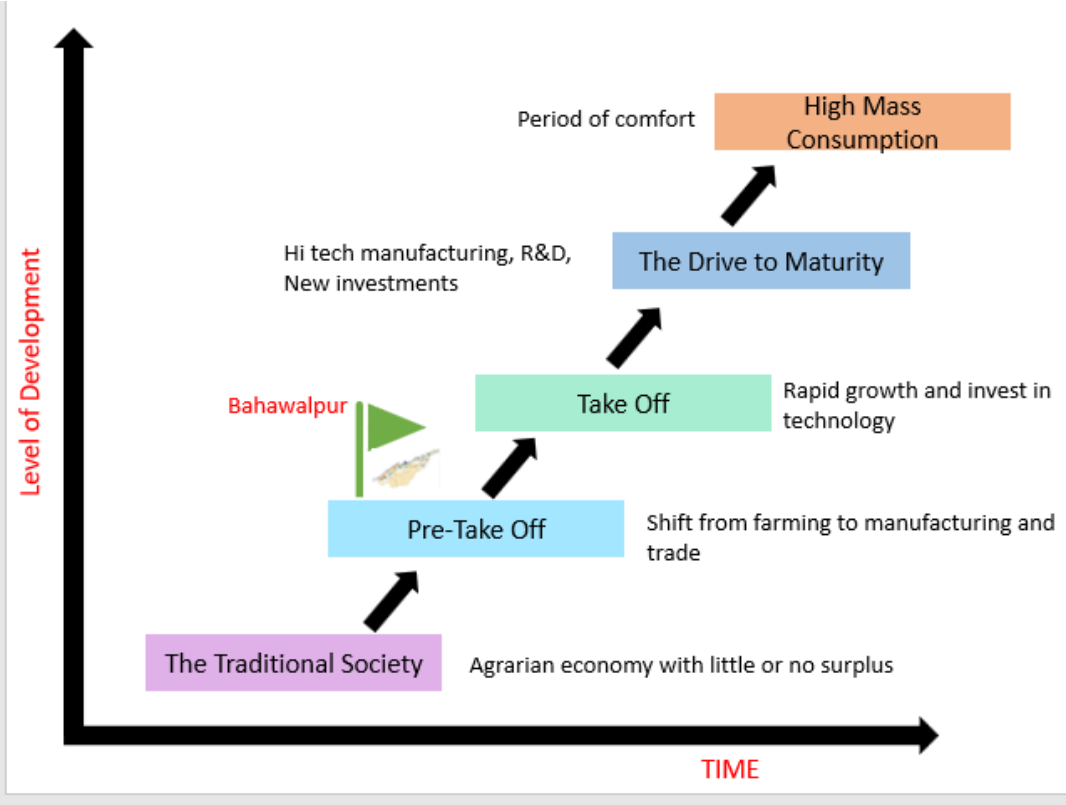


Figure 5: Rostow's Model for Bahawalpur Region.

In comparison to other regions of Punjab, the Bahawalpur district is still not developed. The transition from agriculture to the industry has not been rapid from 1951 to 2018 as compared to other regions. Also, establishment of industry in this area is only 16.92 percent which is only lower than D.G. Khan.

2.5. SWOT Analysis

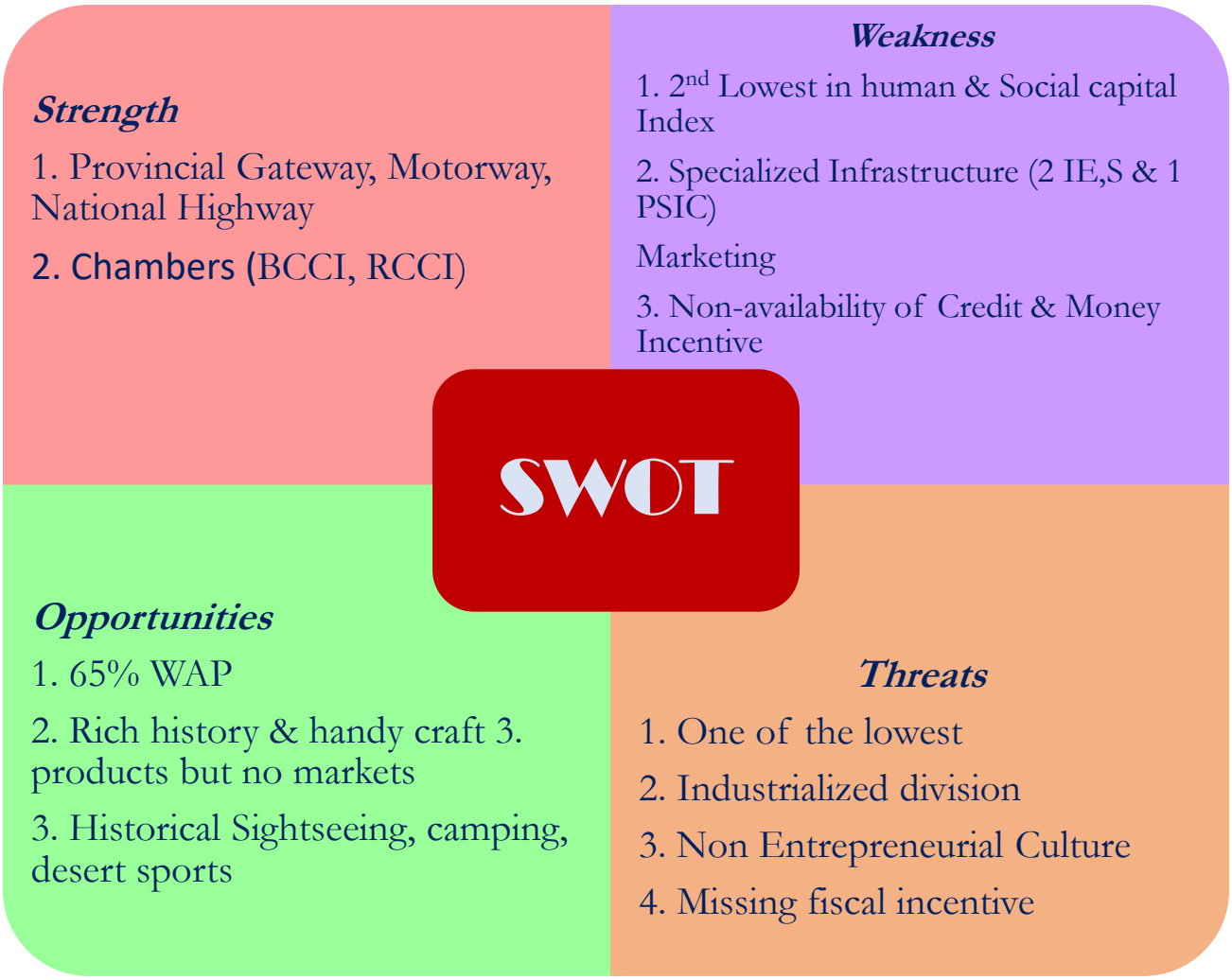


Figure 6: Bahawalpur Industrial Development- Challenges & Opportunities (SWOT Analysis)

In this figure 6, SWOT analysis for this region is been presented. It can be seen that the labor force has immense potential as 65 percent of the working-age population is employed, which is a positive sign of utilization of available resources. Also, this area connects to other regions through the provincial gateway, motorway, and national highway, which means not just human mobility but also the portability of goods can be systemized with little planning. Moreover, the crafts and traditional product is an attraction of this area, which can not only benefit economically but focusing on this sector will also preserve heritage. Similarly, tourism is appealing for visitors, and setting up an efficacious industry can generate impressive returns. Moreover, chambers of commerce are established here, that provide a platform to the business community for agglomeration, marketing, and raising their concerns.

The existing industrial base of this region is the weakest one, which means it needs attention for a better future. Despite accommodating 65 percent of the working-age population, Bahawalpur is not been able to maintain the quality of labor. And, to improve this quality micro intervention in the form of educational and vocational training must be encouraged. The lagging of specialized infrastructure and marketing capabilities are also pulling this region down which means the competitiveness of goods and services is compromised, not only at the international level but also at the national level. Furthermore, the non-establishment of entrepreneurial culture has led to reliance on existing resources rather than on creating new opportunities; and through pioneering initiatives, both new and emerging industries will get a boost, and higher momentum of jobs will be generated. Thus, identified strengths and weaknesses need an emphasis from policy-making entities. By addressing mentioned issues, this region can get an appraisal and compete with other regions of the province, country, and the world.

This region has the 2nd lowest industrialization and needs a tactical and different approach as compared to the northern regions of Punjab. Therefore, to lift the industrial and economic base government should focus on different levels with hard and soft interventions. It is also necessary to address the key issues related to the industrial and allied sectors. For example, small units or firms should be nourished in a favorable environment to transform themselves into large units and act as a pioneer of industrial development in the region or attract other investors with motivational success stories.

To begin with, we propose the interventions at two levels simultaneously i.e. for MSME and medium and large-scale units. Similarly, the development of SMEs is constrained by few accessibilities that are leading to lagging of the region. These constraints include:

- Non-business friendly environment that is not regulated by federal or local government;
- The same is the case of non-establishment human resources because of non-training of this human capital in the desired manner, this situation leads to the establishment of low value-added manufacturing.
- SME's operates on moderately inferior technology than the Large industries the ones that are internationally recognized. This results in non-competitiveness with not just international goods but also at the local or national level.
- Usually, entrepreneurship is transferred to another generation as a tradition, and the entry of newcomers is minimal resulting in very few new enterprises.

Similarly, there are several reasons for the failure of new startups such as legal challenges, running out of cash, incompetency, pricing and cost issues, unmet product requirements (such as unfriendly user product or mismatched product), failed geographical expansion, and poor marketing skills. These several interventions are necessary to establish a strong base in the region and develop competitiveness/ regional specialization

2.6. Compatibility Comparison of Large, Medium and Small-Scale industry

Table 2 is a representation of the industrial structure of this region. There are total 17 large-scale units and employ 23661 individuals; 53 medium-scale units and employ 5019 individuals; whereas 915 small-scale units by employing 13533 individuals. From these mentioned statistics it can be retrieved that: large-scale firms are lesser in number, but despite this fact has the potential to employ more individuals than their counterparts.

Table 2: Medium Scale Industries Sectoral and Industrial Share

	Total Number of Firms	Employment
Large	17	15131
Medium	53	5036
Small	915	12894

Large-scale industries in the Bahawalpur region have immense potential. Precisely, the comparison of these industries with medium scale and small scale provides a vast illustration. There are five operating units of the sugar industry as per CMI data 2015-16; has a major share in large-scale industries of around 31% and provides employment to almost 13% of individuals in this sector specifically. However, the fact that “sugar” and “cordage, rope, twine, and netting” firms are operating only at a large scale here reflects the potential of these industries on this level.

Furthermore, the only industry operating in all three scales i.e. large, medium, and small is building materials. There are 0.46% of units at large scale, 12.79% are at medium level, and 86.76 % units function at a small scale. Moreover, despite a greater number of units in small-scale units in this specific industry, large-scale units have more potential. And, it can be accessed from the fact that the largest-scale units have a share of

61.78%, medium-scale shares are 12.3% and small scale has a 25.92% share of employment of this industry.

Moreover, a comparison of large-scale and small-scale units within the same industries reflects the differences in potential capacity. Tables 24, 25, and 26 in Appendix are representing sectoral and industrial share of different industries. The following points are contributing to the discussion in a similar context:

- Food Products N.E.C. industry is operating at small-scale with 12.5% units with the employment of 76.77% and large-scale with 87.5% units with the employment of 23.23% units.
- Fertilizers and Nitrogen Compounds with 50% units at large scale with 99.58% employment 50% units at a small scale with 0.42% of employment.
- Soap and Detergents, Cleaning and Polishing Preparations, Perfumes and Toilet Preparations with 12.5% units at large scale provides 90.99% employment and 87.5% unit at small scale and employs 9.01%.
- Soft Drinks; Production of Mineral Waters And Other Bottled Waters has 14.29% of operating units at large scale with 86.4% employment; and 85.71% units at small scale that employs 13.58%.
- The weaving of Textiles industry has 16.67% units at large scale and 95.42% employment; and 83.33% units at small-scale with 4.58% of employment.

Thus, from the above-mentioned statistics, it is generalized that a large-scale industry can accommodate more employees and have more prospects of growth. Nevertheless, a similar trend can be noticed in medium-scale and small-scale industries; and the following points are highlighting different capacities of the same industry on different levels.

- Basic Iron And Steel have 14.29% units at medium scale with 65.22% employment and 85.71% units at a small scale with 34.78% employment of the industry.
- Electrical Equipment industries have 50% firms in medium-scale and 50% in small scale industry with 95.06 and 4.94% employment.
- Textiles N.E.C. has 30.77% firms in medium-scale with 51.3% and has 69.23% in small scale industry with 48.7% employment.
- Pesticides And Other Agrochemical Products 16.67% is functioning in medium-scale with 58.04% employment and 83.33% in small scale with 41.96% employment.

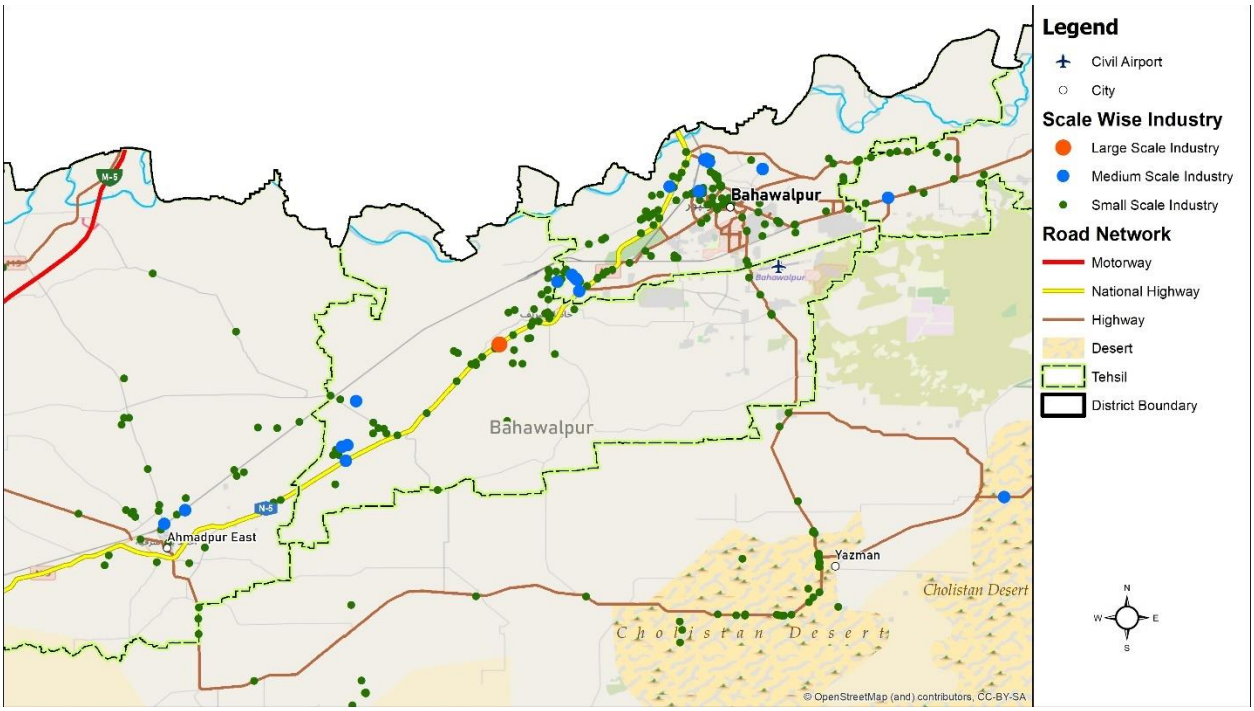
- Pharmaceuticals, Medicinal Chemical And Botanical Products 33.33% are operating at medium-scale with 78.57% employment and 66.67% in small scale with 21.43% employment.
- Plastics Products 12.5% in medium scale with 87.91% employment, 87.5% in small scale with 12.09% employment.
- Prepared Animal Feeds with 20% in medium-scale with 61.22% employment and 80% small scale with 38.78% employment.

Despite the fact, these industries have a higher number of units on small-scale but provide more employment opportunities by medium-scale firms. Hence, this generalizes a higher capacity unit is better than a smaller one.

2.7. District Wise Analysis

2.7.1. Industrial Outlook of Bahawalpur District

Within the Bahawalpur region, the Bahawalpur district has immense potential. The map 3 below is the mapping of industries in the Bahawalpur district. This explanations location of small, medium, and large-scale enterprises across different road networks such as a motorway, national highways, and deserts.



Map 3: Industrial spread in Bahawalpur District

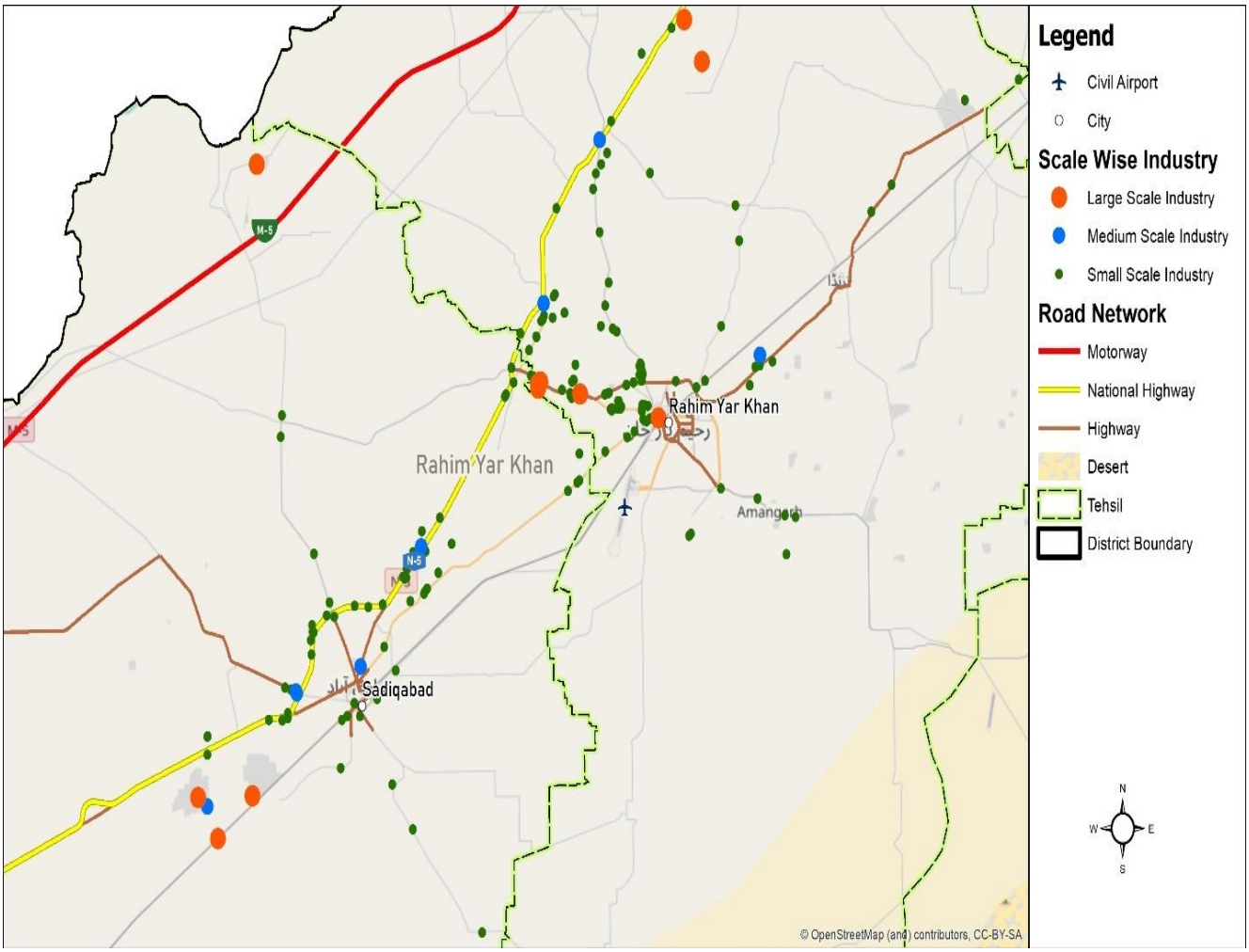
Table 3 is an explanation of the total number of firms in different industries of the Bahawalpur district. It can be accessed from this table that the maximum number of firms are in the building material industry and accommodates 15214 labor. This is followed by the Vegetable and Animal Oils and Fats industry that has 118 firms with 2391 labor. While, the plastic products industry has only 6 firms that employ only 29 employees altogether.

Table 3: Industries Description in Bahawalpur District

Industries	Large Units	Medium Units	Small Units	Grand Total	Total Employment
Building Materials	1	12	107	120	15214
Vegetable and Animal Oils and Fats	-	4	114	118	2391
Grain Mill Products	-	3	21	24	605
Bakery Products	-	1	60	61	400
Products Concrete & Cement	-	1	9	10	271
Furniture	-	-	21	21	189
Agrochemical Products	-	1	4	5	102
Cutting, Shaping of Stone	-	-	28	28	97
Agricultural And Forestry Machinery	-	-	7	7	81
Fabricated Metal Products	-	-	9	9	68
Basic Iron And Steel	-	-	6	6	64
Dairy Products	-	-	9	9	44
Soft Drinks Bottled Waters	-	-	4	4	40
Plastics Products	-	-	6	6	29
Other	1	2	23	26	1596
Grand Total	2	24	428	454	21191

2.7.2. Industrial Outlook of Rahim Yar Khan District

Another district of Bahawalpur division is Rahim Yar Khan. Map 4 is a photographic display of industries in Rahim Yar Khan district. From this map, we can analyze the location of small, medium, and large enterprises on different road networks.



Map 4: Industrial spread in Rahim Yar Khan District

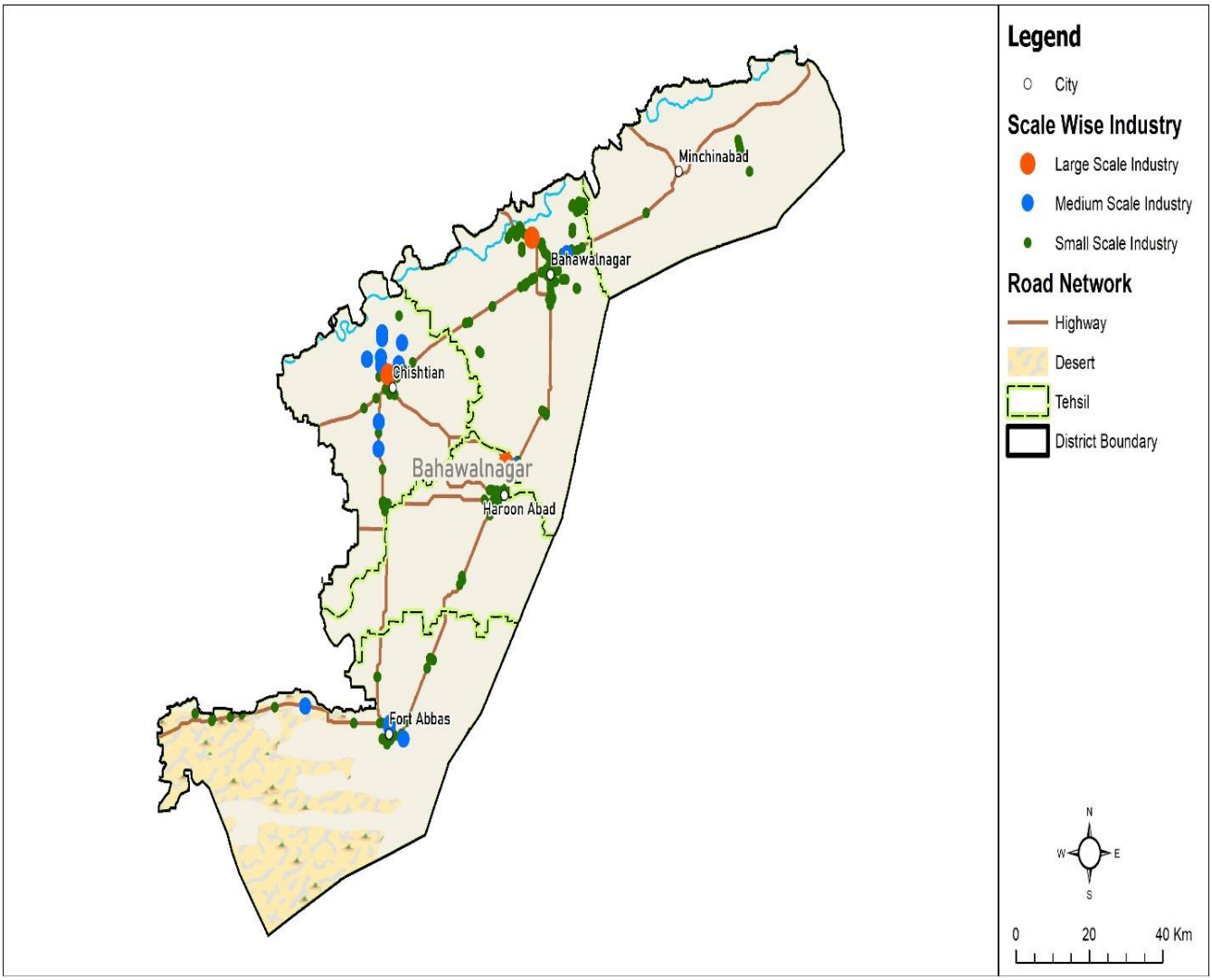
Table 4 explains that in this district, there are 4 firms in the sugar industry that employs 2194 labor, whereas the fertilizers industry has only one firm with 5415 laborers.

Table 4: Industries Description in Rahim Yar Khan District

Industries	Large Units	Medium Units	Small Units	Grand Total	Total Employment
Fertilizers	2	-	-	2	5415
Sugar	4	-	-	4	2193
Spinning of Textile Fibers	2	-	-	2	1305
Grain Mill Products	-	1	58	59	930
Clay Building Materials	-	4	45	49	777
Dairy Products	1	-	1	2	667
Weaving of Textiles	1	-	5	6	524
Soap and Detergents	1	-	4	5	448
Soft Drinks	1	-	-	1	350
Basic Iron and Steel	-	1	-	1	120
Cutting, Shaping and Finishing Of Stone	-	-	10	10	49
Agricultural and Forestry Machinery	-	-	6	6	44
Articles of Concrete, Cement and Plaster	-	-	6	6	42
Bakery Products	-	-	4	4	40
Motorcycles	-	-	1	1	30
Corrugated Paper and Paperboard	-	-	2	2	19
Basic Chemicals	-	-	1	1	10
Others	-	9	91	100	1643
Total	**12**	**15**	**234**	**261**	**14606**

2.7.3. Industrial Outlook of Bahawalnagar District

The third district of the Bahawalpur region is Bahawalnagar. Map 5 explains industrial spread in the Bahawalnagar district. This region has lessor desert areas as compared to Bahawalpur and Rahim Yar Khan districts. However, the spread of enterprises across road networks is more diverse as compared to the other two districts.



Map 5: Industrial spread in Bahawalnagar District

From table 5 below, it can be retrieved this district has the highest number of employees i.e. 1995 with 50 operating units at small and medium levels. Whereas, there are 500 employs in the Cordage, Rope, Twine, and Netting industry with only one operating firm at large scale. Whereas the lowest number of employs of 5 are found in motor vehicles industry with one firm at small-scale.

Table 5: Industries Description in Bahawalnagar District

Industries	Large Units	Medium Units	Small Units	Grand Total	Total Employment
Clay Building Materials	-	12	38	50	1995
Grain Mill Products	-	2	89	91	1494
Cordage, Rope, Twine and Netting	1	-	-	1	500
Bakery Products	-	-	54	54	444
Other Food Products N.E.C.	1	-	1	2	319
Furniture	-	-	20	20	183
Cutting, Shaping and Finishing Of Stone	-	-	21	21	89
Articles of Concrete, Cement and Plaster	-	-	6	6	88
Agricultural and Forestry Machinery	-	-	7	7	49
Corrugated Paper and Paperboard	-	-	1	1	25
Bodies for Motor Vehicles	-	-	1	1	5
Others	-	1	66	67	1225
Total	2	15	304	321	6416

Skill Mapping

Bahawalpur Regional Economic Growth Strategy

3. Skill Formation

3.1. Baseline Statistics

In division Bahawalpur, Agriculture sector contains most labor force having 56% of total labor force followed by Services having 27% and Industries 17% (as shown in figure 7). If look at the sectoral distribution over time, the following figure 8, which shows that share of labor force in agriculture sector increased from 56% in 2010 to 61% in 2014 but it decreased to same level in 2018 whereas share of labor force in industries constantly increased from 10.8% in 2010 to 15% in 2014 and to 17% in 2018. Lastly, employment share of services sector declined from 33% in 2010 to 23.9% in 2014 and it suddenly increased to 26.6% in 2018.

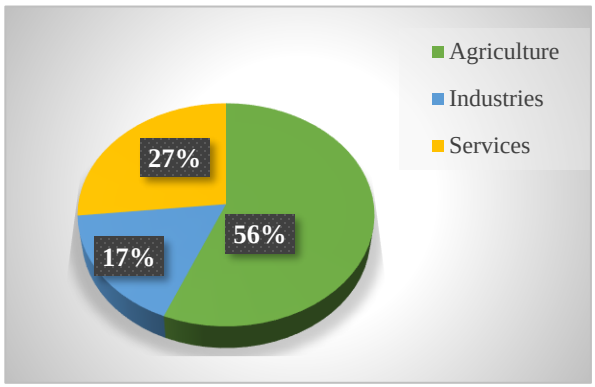
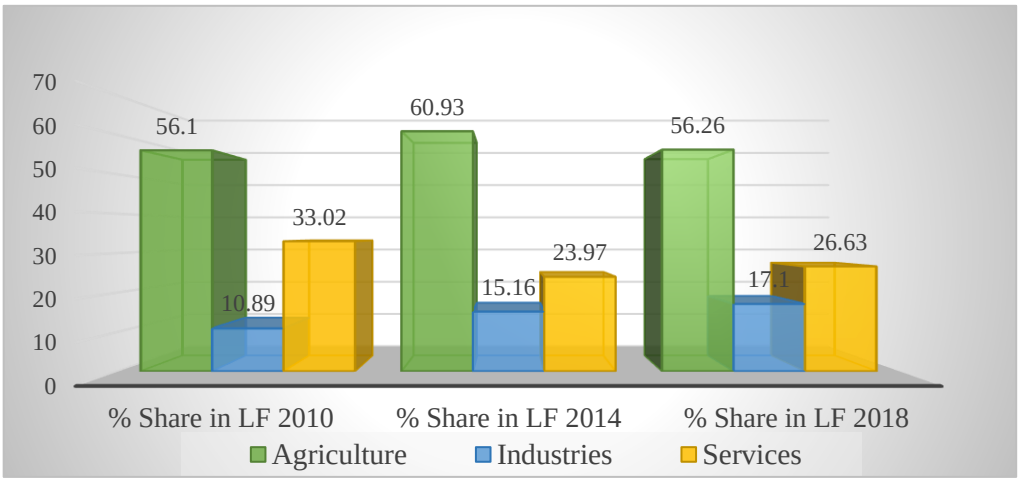


Figure 7: LF share in Bahawalpur (LFS 2018)



This chart shows an apparent growth of industrial sector in Bahawalpur over time.

Figure 8: Change in sectoral share in Bahawalpur (LFS 2010 vs LFS 2014 vs LFS 2018)

3.1.1. Sub-Sectoral Profiles (LFS 2018)

Table 10 shows the percentage employment share of top ten sub-sectors of Bahawalpur division at PSIC 2-digit level. As shown in the table, "*Crop and animal production, hunting and related service activities*" contains highest share of labor force i.e., 56% and it is included in Agriculture sector. It is followed by "*Retail trade, except of motor vehicles and motorcycles*" which is part of services sector and contains 8.6% labor share. Moreover, the third highest shareholder is "*Construction of buildings*" which contains 5% employment share, and it is included in Industries sector.

Table 6: Top 10 subsectors in Bahawalpur Division in LFS 2018

Sub-sector	PSIC Code	Sector	Percent
Crop and animal production, hunting and related service activities	1	Agriculture	55.96
Retail trade, except of motor vehicles and motorcycles	47	Services	8.61
Construction of buildings	41	Industries	5.11
Land transport and transport via pipelines	49	Services	3.74
Manufacture of wearing apparel	14	Industries	3.57
Education	85	Services	2.41
Wholesale and retail trade and repair of motor vehicles and motorcycles	45	Services	2.09
Food and beverage service activities	56	Services	1.87
Manufacture of other non-metallic mineral products	23	Industries	1.57
Manufacture of textiles	13	Industries	1.47

3.1.2. Sub-Sectoral Profile (LFS 2014-2015)

Table 7: Top 10 sub-sectors in District Bahawalpur (LFS 2014-15)

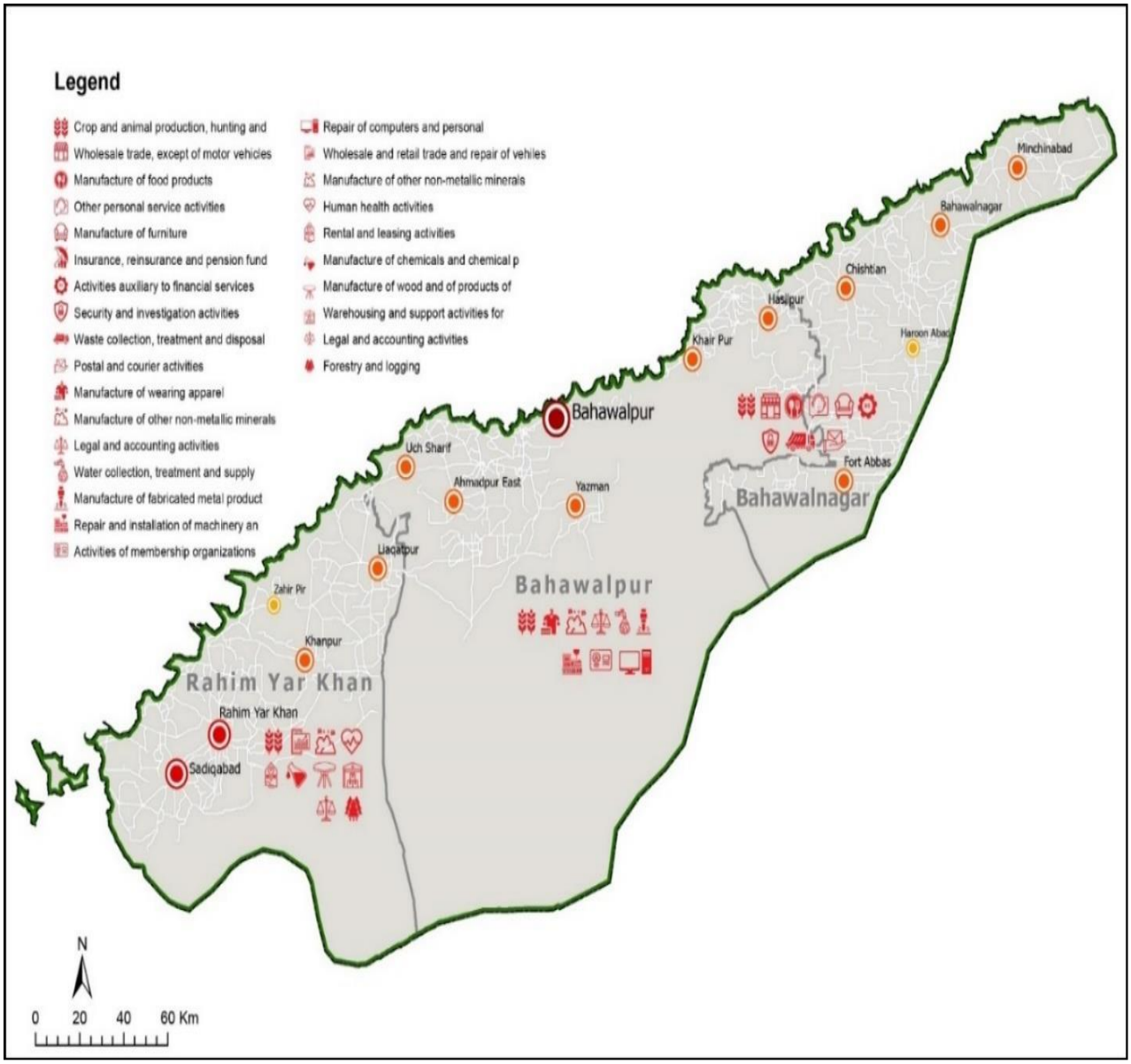
Sub sector	Sector	Percent	Gender ratio
Crop and animal production, hunting and related service activities	A	59.26	21.3
Retail trade, except of motor vehicles	S	7.18	40.53
Construction of buildings	I	5.2	14.39
Manufacture of wearing apparel	I	3.88	2.61
Manufacture of textiles	I	2.77	0.84
Land transport and transport via pipeline	S	2.75	20.7
Manufacture of other non-metallic mineral products	I	2.6	3.75
Education	S	2.51	52.05
Wholesale trade, except of motor vehicles and motorcycles	S	1.5	6.69
Wholesale and retail trade and repair of motor vehicles and motorcycles	S	1.4	5.00

Table 8: Top 10 sub-sectors in District Bahawalnagar (LFS 2014-15)

Sub sector	Sector	Percent	Gender ratio
Crop and animal production, hunting and related service activities	A	61.13	1.63
Retail trade, except of motor vehicles	S	9.04	1.39
Construction of buildings	I	4.04	0.73
Land transport and transport via pipeline	S	3.42	0.72
Wholesale trade, except of motor vehicles and motorcycles	S	3.3	0.99
Manufacture of wearing apparel	I	2.64	0.60
Education	S	2.48	1.29
Manufacture of food products	I	1.85	0.88
Other personal service activities	S	1.12	0.85
Manufacture of furniture	I	0.95	0.22

Table 9: Top 10 sub-sectors in District Rahim Yar Khan (LFS 2014-15)

Sub sector	Sector	Percent	Gender ratio
Crop and animal production, hunting and related service activities	A	61.88	2.80
Retail trade, except of motor vehicles	S	9.39	2.39
Construction of buildings	I	4.37	1.67
Land transport and transport via pipeline	S	2.63	1.74
Manufacture of wearing apparel	I	2.45	1.07
Wholesale and retail trade and repair of motor vehicles and motorcycles	S	2.22	0.84
Education	S	1.72	1.74
Manufacture of other non-metallic mineral products	I	1.58	1.87
Manufacture of food products	I	1.31	1.81
Human health activities	S	1.23	5.90



Map 6: Top 10 sub-sectors

Source: *LFS 2017*

3.2. Location Quotient (LFS 2014)

3.2.1. District Bahawalpur LQ

Table 6 shows that the "Crop and animal production, hunting" is highly concentrated sector in the Bahawalpur district and the percentage labor force employed in this sub sector is fairly high amounting to 59 percent. Following that, other highly concentrated sectors of the district with a high share of districts' labor force include Manufacture of wearing apparel, Manufacture of other non-metallic minerals and so on. More than 65 percent of the labor force in this district in engaged in the aforementioned subsectors.

Table 10: Location Quotient Analysis Bahawalpur District (LFS 2014)

Sub-sector	PSIC CODE	LQ Index	% LF Share
Crop and animal production, hunting and	1	**1.32**	59.24
Manufacture of wearing apparel	14	**1.01**	3.88
Manufacture of other non-metallic minerals	23	**1.58**	2.6
Legal and accounting activities	69	**1.07**	0.3
Water collection, treatment and supply	36	**1.38**	0.18
Insurance, reinsurance and pension fund	65	**1.67**	0.15
Activities auxiliary to financial services	66	**3.50**	0.14
Security and investigation activities	80	**1.75**	0.14
Waste collection, treatment and disposal	38	**1.20**	0.12
Postal and courier activities	53	**1.13**	0.09
Residential care activities	87	**2.00**	0.08
Other professional, scientific and tech	74	**1.00**	0.05

3.2.2. District Bahawalnagar LQ

Table 7 shows that the "Crop and animal production, hunting" is highly concentrated sector in the Bahawalnagar and the percentage labor force employed in this sub sector is fairly high amounting to 61 percent. Following that, other highly concentrated sectors of the district with a high share of districts' labor

force include Manufacture of food, Wholesale trade, except of motor vehicles and so on. More than 65 percent of the labor force in this district in engaged in the aforementioned subsectors.

Table 11: Location Quotient Analysis Bahawalnagar District (LFS 2014)

Sub-sector	PSIC CODE	LQ Index	% LF Share
Crop and animal production, hunting and	1	**1.36**	61.1
Wholesale trade, except of motor vehicles	46	**1.80**	3.31
Manufacture of food products	10	**1.20**	1.86
Other personal service activities	96	**1.13**	1.12
Manufacture of furniture	31	**1.16**	0.95
Manufacture of fabricated metal product	25	**0.95**	0.83
Repair and installation of machinery an	33	**0.99**	0.72
Activities of membership organizations	94	**1.43**	0.6
Repair of computers and personal and ho	95	**1.02**	0.55
Water collection, treatment and supply	36	**2.08**	0.27
Warehousing and support activities for	52	**1.08**	0.26
Veterinary activities	75	**3.00**	0.21
Creative, arts and entertainment activi	90	**1.82**	0.2
Civil engineering	42	**1.07**	0.15

3.2.3. District Rahim Yar Khan

Table 8 shows that the "Crop and animal production, hunting" is highly concentrated sector in the Rahimyar Khan and the percentage labor force employed in this sub sector is fairly high amounting to 62 percent. Following that, other highly concentrated sectors of the district with a high share of districts' labor force include Wholesale and retail trade and repair of vehicles, Manufacture of other non-metallic minerals and so on. More than 65 percent of the labor force in this district in engaged in the aforementioned subsectors.

Table 12: Location Quotient Analysis Rahimyar Khan District (LFS 2014)

Sub-sector	PSIC CODE	LQ Index	% LF Share
Crop and animal production, hunting and	1	**1.38**	61.91
Wholesale and retail trade and repair of vehiles	45	**1.40**	2.23
Manufacture of other non-metallic minerals	23	**0.96**	1.58
Human health activities	86	**1.16**	1.23
Rental and leasing activities	77	**2.75**	0.44
Manufacture of chemicals and chemical p	20	**1.83**	0.44
Manufacture of wood and of products of	16	**1.13**	0.43
Warehousing and support activities for	52	**1.71**	0.41
Legal and accounting activities	69	**1.14**	0.32
Forestry and logging	2	**2.67**	0.24
Civil engineering	42	**1.29**	0.18
Veterinary activities	75	**1.43**	0.1
Social work activities without accommodation	88	**1.33**	0.08
Residential care activities	87	**1.75**	0.07
Publishing activities	58	**2.00**	0.06
Employment activities	78	**5.00**	0.05
Water transport	50	**2.00**	0.02

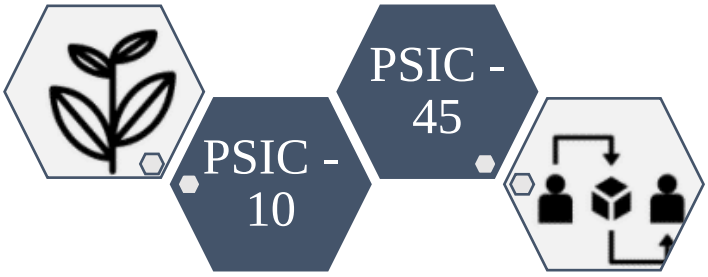


Figure 9:Top sub-sectors

Key points: The sub-sectors mentioned below are highly concentrated and specialized across all districts of division Bahawalpur, as highlighted by the Location quotient indices, while also having a large share of the total labor force in each district. The LQ values are greater than the metric value of 1.05, hence providing evidence for this region's specialization in these sub-sectors.

Thus, channelizing resources to upskill workers in activities pertaining to these sub-sectors would aid in improving the overall productivity of the labor force, while also helping to achieve sustainable regional economic growth.

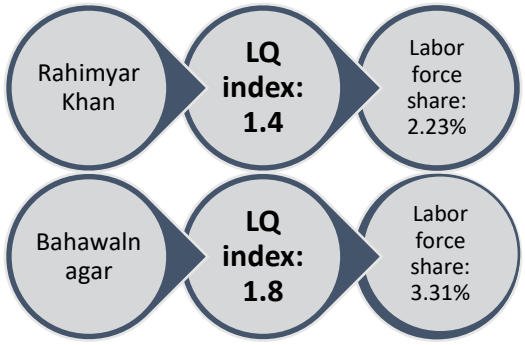


Figure 10: Wholesale and retail trade and repair of vehicles [PSIC 45]

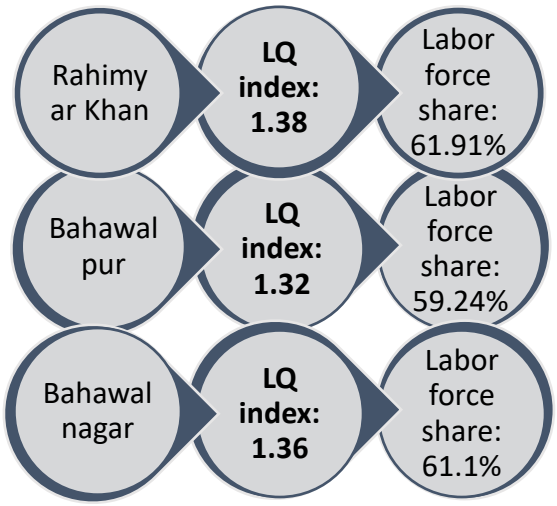


Figure 11: Crop, animal production and hunting [PSIC 1]

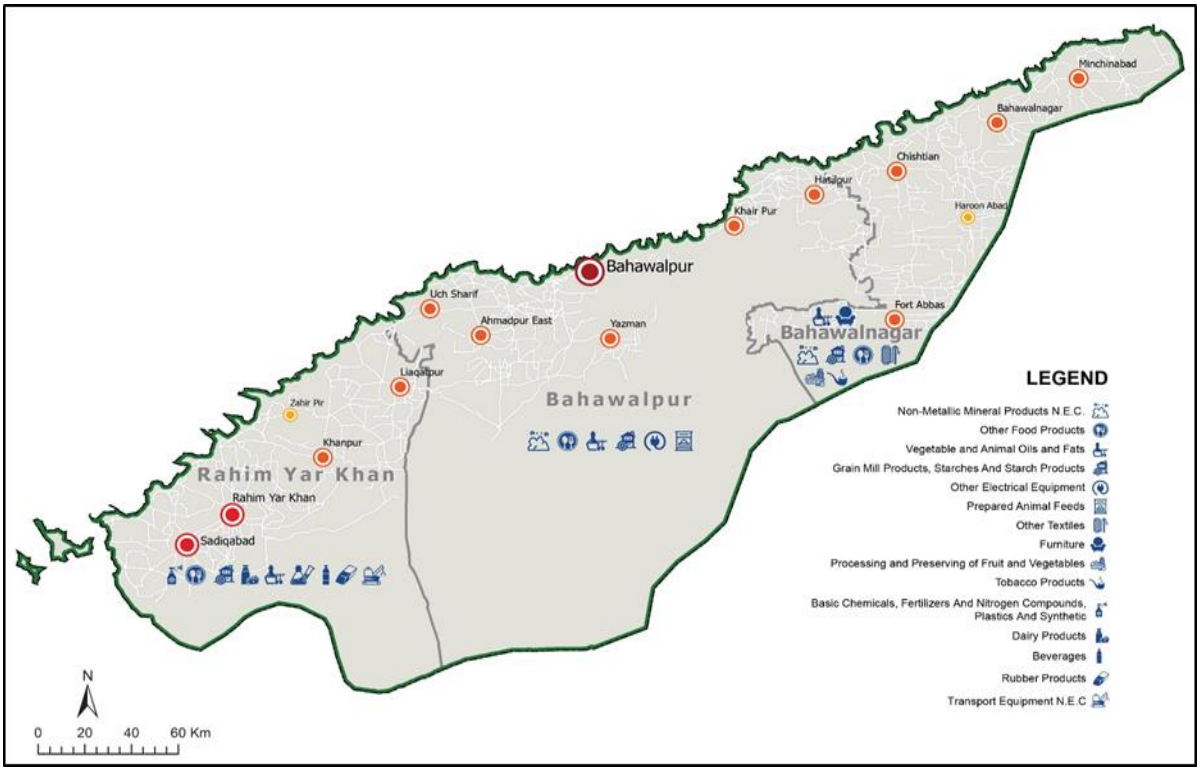
Specialized TEVTA courses should be developed that are targeted towards the following activities – according to PSIC code classification of these aforementioned sub-sectors:

Crop, animal production and hunting [PSIC 1]:

- Growing of non-perennial crops;
- Growing of perennial crops;
- Plant propagation;
- Animal production;
- Support activities to agriculture and post-harvest crop activities;
- Mixed farming

Wholesale and retail trade and repair of vehicles [PSIC 45]:

- Sale of motor vehicles
- Maintenance and repair of motor vehicles
- Sale of motor vehicle parts and accessories



Map 7: Top sub-sectors in each district of Bahawalpur

Source: CMI 2017

3.3 Location quotient (CMI 2017)

The below mentioned subsectors are highly concentrated and specialized across all districts of Bahawalpur division.

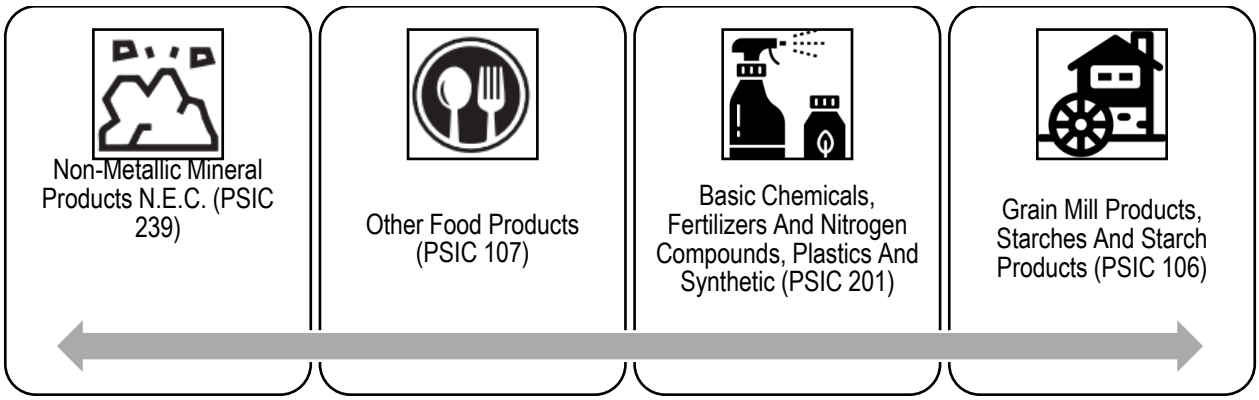


Figure 12: Top sub-sectors in Bahawalpur division

3.3.1. District Bahawalpur LQ

The table 6 shows the concentration and specialization along with respective share of labor force in Bahawalpur district using the CMI 2017 data. In this region, the sector "Other Electrical Equipment"[1] is highly concentrated sector having 2.28% share of employment which is negligible compared to other sectors. The sectors "Non-Metallic Mineral Products N.E.C." constitutes 41% of LF followed by "Other Food Products" having 24% LF. Both of these are large firms and are specialized too.

Table 13: Location Quotient Analysis District Bahawalpur (CMI 2017-18)

Sub-sector	PSIC code	LQ Index	% share of LF
Non-Metallic Mineral Products N.E.C.	239	4.53	41.08
Other Food Products	107	4.49	24.41
Vegetable And Animal Oils And Fats	104	14.64	16.46
Grain Mill Products, Starches And Starch Products	106	1.42	5.66
Other Electrical Equipment[2]	279	15.79	2.28
Prepared Animal Feeds	108	1.90	1.46

3.3.2. District Bahawalnagar LQ

The table 7 shows the concentration and specialization along with respective share of labor force in district Bahawalnagar using the CMI 2017 data. It is evident that the highly specialized sector is "Manufacture of Tobacco Products" having 0.21% share of total labor force. The other specialized sectors with significant workforce in the region are "Non-Metallic Mineral Products N.E.C." having 33% labor force and 3.67 LQ, followed by "Grain Mill Products, Starches and Starch Products" with 23.4% employment and 5.88 LQ. The sub-sector "Other food products" is also specialized having 4.24 LQ and 23% LF. There are three large firms in district Bahawalnagar.

[1] This class includes the manufacture of miscellaneous electrical equipment other than motors, generators and transformers, batteries and accumulators, wires and wiring devices, lighting equipment or domestic appliances. It includes manufacture of battery chargers, electric bells, sirens etc.

[2] This class includes the manufacture of miscellaneous electrical equipment other than motors, generators and transformers, batteries and accumulators, wires and wiring devices, lighting equipment or domestic appliances. It includes manufacture of battery chargers, electric bells, sirens etc.

Table 14: Location Quotient Analysis District Bahawalnagar (CMI 2017-18)

Sub-sector	PSIC code	LQ Index	% share of LF
Non-Metallic Mineral Products N.E.C.	239	3.67	33.31
Grain Mill Products, Starches And Starch Products[3]	106	5.88	23.42
Other Food Products[4]	107	4.24	23.06
Other Textiles	139	1.16	8.18
Vegetable And Animal Oils And Fats	104	4.42	4.97
Furniture	310	1.72	3.72
Processing And Preserving Of Fruit And Vegetables	103	1.22	0.25
Tobacco Products	120	6.88	0.21

3.3.3. District Rahim Yar Khan

The table 8 shows the concentration and specialization along with respective share of labor force in district Rahim Yar Khan using the CMI 2017 data. As shown in the table, "Basic Chemicals, Fertilizers And Nitrogen Compounds, Plastics And Synthetic" is highly concentrated sector in the region. It also contains highest share of labor force in the district i.e., 35.3%. The "Other Food Products" is specialized sector and has 18% employment share which is higher than the preceding two sectors.

[3] This group includes the milling of flour or meal from grains or vegetables, the milling, cleaning, and polishing of rice, as well as the manufacture of flour mixes or doughs from these products. Also included in this group are the wet milling of corn and vegetables and the manufacture of starch and starch products.

[4] This group includes the production of bakery products, sugar and confectionery, macaroni, noodles and similar products, prepared meals and dishes, coffee, tea and spices, as well as perishable and specialty food products.

Table 15: Location Quotient Analysis District Rahim Yar Khan (CMI 2017-18)

Sub-sector	PSIC code	LQ Index	% share of LF
Basic Chemicals, Fertilizers And Nitrogen Compounds, Plastics And Synthetic[5]	201	36.62	35.37
Other Food Products	107	3.34	18.15
Grain Mill Products, Starches And Starch Products	106	1.91	7.60
Dairy Products	105	6.50	4.33
Vegetable And Animal Oils And Fats	104	3.37	3.79
Other Chemical Products	202	2.02	3.04
Beverages	110	1.42	2.27
Rubber Products	221	1.68	0.97
Transport Equipment N.E.C	309	0.94	0.78

Key points:

The below mentioned subsectors are highly concentrated (having most employment share) and specialized (having LQ > 1.05) across all districts of Bahawalpur division. As shown in the infographics, each subsector has been mapped in accordance with its LQ Index and labor force share in respective district. Hence, TEVTA should develop courses targeting these activities to these sub-sectors would improve overall productivity of the labor force, , while also helping to achieve sustainable regional economic growth.

[5] This group includes the manufacture of basic chemical products, fertilizers, and associated nitrogen compounds, as well as plastics and synthetic rubber in primary forms.

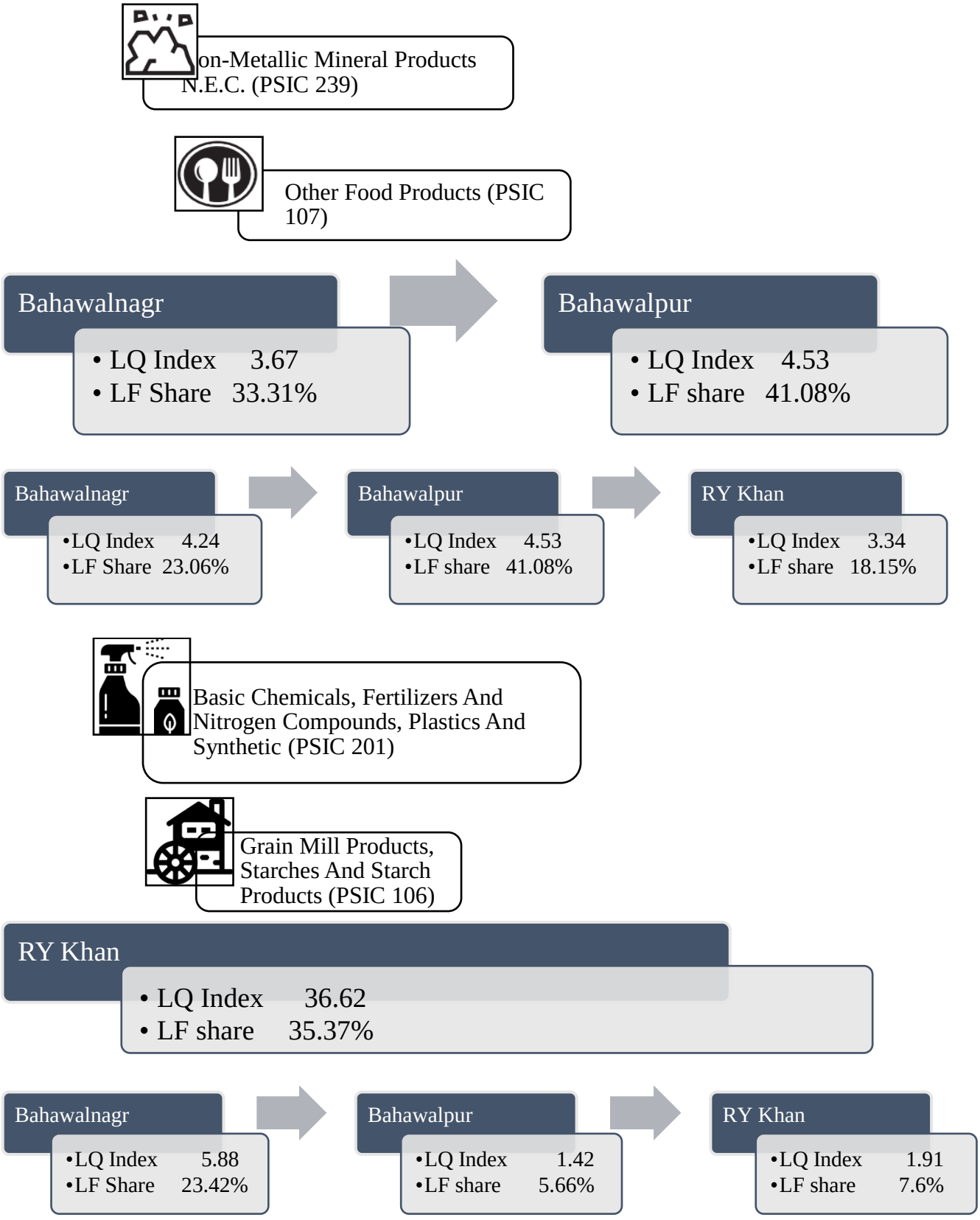


Figure 13: Top specialized and concentrated sub-sectors in Bahawalpur Division

3.4 Shift Share Analysis (LFS 2010 & LFS 2018)

Table 6 depicts the change in employment during 2010 to 2018 period at sub-sector level. Using the SSA approach this employment change is decomposed into provincial growth effect, industry mix effect and competitive effect. The SSA analysis shows an increase of more than 833,175 employees in 'Crop and animal production, hunting and related service activities. Out of this total employment effect, there is some growth due to provincial growth effect, while a decrease in employment due to industrial mix effect. The remaining employment growth of 343,725 is due to the local competitive effect of the region Bahawalpur. Next to 'Crop and animal production, hunting and related service activities,' the region also enjoys competitive effect growth in the following sectors: 'Manufacture of leather and related products,' 'Education,' 'Insurance, reinsurance and pension funding, except compulsory social security.'

Table 16: Shift Share Analysis (2010-2018) for Bahawalpur Division showing employment growth and competitiveness at Sub-sector (PSIC 2 digit) level

Sub-Sector	PSIC2	Provincial Growth Effect	Industry Mix Effect	Competitive Effect	Total Change in Employment
Crop and animal production, hunting and related service activities	1	457,693	(59,244)	434,725	833,175
Manufacture of leather and related products	15	9,312	(23,179)	19,715	5,848
Education	85	7,455	58,058	15,550	81,062
Insurance, reinsurance, and pension funding, except compulsory social security	65	1,418	(4,803)	3,084	(301)
Veterinary activities	75	9,131	(38,812)	2,968	(26,713)
Manufacture of coke and refined petroleum products	19	3,807	(16,053)	1,599	(10,647)
Water collection, treatment and supply	36	5,877	(23,456)	953	(16,625)
Other professional, scientific and technical activities	74	1,131	(3,969)	(53)	(2,891)
Manufacture of rubber and plastics products	22	283	65	(382)	(34)
Accommodation	55	4,000	(16,810)	(430)	(13,241)

Sub-Sector	PSIC2	Provincial Growth Effect	Industry Mix Effect	Competitive Effect	Total Change in Employment
Manufacture of motor vehicles, trailers and semi-trailers	29	1,482	(4,806)	(1,145)	(4,469)
Warehousing and support activities for transportation	52	61,380	(265,324)	(1,426)	(205,370)
Manufacture of fabricated metal products, except machinery and equipment	25	764	14,269	(1,606)	13,426
Manufacture of paper and paper products	17	14,426	(59,803)	(2,232)	(47,609)
Security and investigation activities	80	21,117	(89,598)	(2,558)	(71,039)
Financial service activities, except insurance and pension funding	64	728	3,204	(3,586)	345
Printing and reproduction of recorded media	18	24,070	(100,687)	(4,589)	(81,206)
Forestry and logging	2	1,366	4,601	(9,117)	(3,150)
Wholesale and retail trade and repair of motor vehicles and motorcycles	45	51,406	(163,080)	(13,117)	(124,791)
Manufacture of wearing apparel	14	293	257,498	(39,941)	217,850
Manufacture of other non-metallic mineral products	23	1,081	212,758	(147,083)	66,755

Bahawalpur with leading competitive effect in the following sectors should look to improve skills through courses recommended in the table. This will bring about growth in the respective sectors which are projected to have a larger workforce in the upcoming years. For improved agricultural techniques and practices, 'Diploma in Agriculture Science (DAS)'and FSc Pre Agriculture at higher level can bring about the desired result. For manufacture of leather and related products, courses that cover up the procedures from production till final processing for optimum quality are recommended. Since the division also has a competitive edge in refined petroleum productions, courses in 'petroleum technology,' 'plant operation' and quality control are required to be instructed.

Table 17: Recommended TEVTA courses

Sub Sector	Recommended Courses
Crop and animal production, hunting and related service activities	Diploma in Agriculture Science (DAS), F.Sc. (Pre-Agriculture); Tractor Mechanic/Technicians; Tractor Operator; Tunnel Farming; Tube well Operators;
Manufacture of leather and related products	Leather Manufacturing (G-III); Leather Garments Stitching; (12M), Leather Processing; Leather Technology (DAE); Leather Work
Insurance, reinsurance and pension funding, except compulsory social security	Diploma in Commerce; Sales Representative
Manufacture of coke and refined petroleum products	Petroleum Technology (DAE); Petrochemical (DAE); Plant Operator (ATs); Plant Process Operator (ATs); Quality Control;

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Insurance, reinsurance and pension funding, except compulsory social security	Diploma in Commerce; Sales Representative
Manufacture of coke and refined petroleum products	Petroleum Technology (DAE); Petrochemical (DAE); Plant Operator (ATs); Plant Process Operator (ATs); Quality Control;

3.6. TEVTA Analysis

Table 20: Total Enrollment in TEVTA from Bahawalpur region:

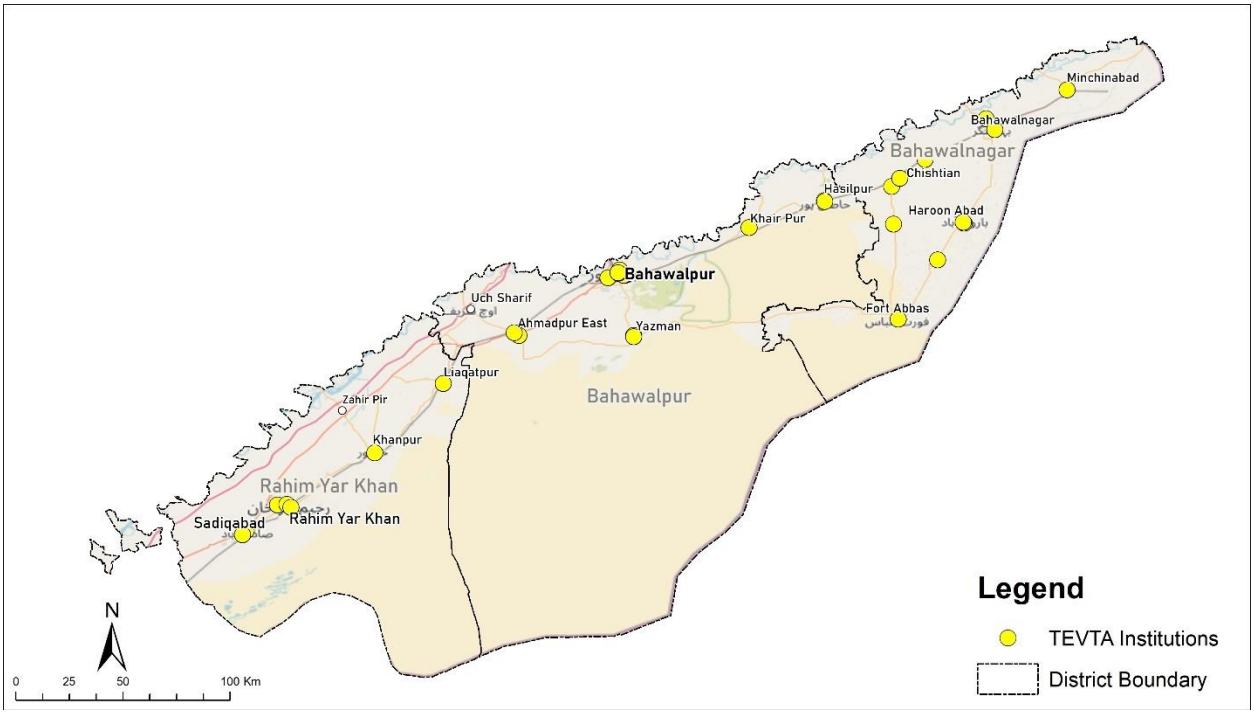
Districts	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	Sum of Total
Bahawalnagar	3500	2387	1488	1962	1067	10404
Bahawalpur	5598	4562	3170	3231	2857	19418
R.Y.Khan	2595	2519	1339	2152	1542	10147
Grand Total	**11693**	**9468**	**5997**	**7345**	**5466**	**39969**

Table 21: Course Specific Enrollment in TEVTA from Bahawalpur region.

Name of Courses	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	Sum of Total
Electrician	1877	1097	616	865	393	4848
Beautician	1484	1044	616	724	562	4430
Microsoft IT Academy	1006	496	0	0	0	1502
Heating Ventilation, Air Conditioning	638	266	69	59	80	1112
Domestic Tailoring	629	609	376	501	279	2394
Welder	577	310	201	228	64	1380
Secruity Guard	530	91	0	0	0	621
Certificate in Computer Applications	511	322	908	1048	730	3519
Tailoring	444	141	97	49	40	771
Mechanical DAE	370	424	282	286	239	1601
Matric Vocational	306	352	357	291	234	1540
Machinist	300	150	41	188	25	704
Civil (DAE)	276	330	222	166	136	1130
Auto & Farm	267	235	110	150	71	833
Auto CAD	243	96	10	26	46	421

Motor Winder	204	121	70	73	36	504
Chinese Language	189	728	46	301	163	1427
Web Designing	174	108	0	25	0	307
Auto Mechanic	169	119	94	152	58	592
Professional Cook	147	175	61	300	117	800
Cooking & Baking	101	45	0	0	0	146
Mobile Repairing	90	55	30	30	0	205
Draftsman	86	93	89	80	41	389
Basic Dress Designing & Making (12M)	85	90	90	97	87	449
Fitter	80	83	87	25	14	289
Others	910	1888	1525	1681	2051	8055
Total	**11693**	**9468**	**5997**	**7345**	**5466**	**39969**

All effective TVET systems in the world are embedded in State's economic development strategies and have strong collaboration and coordination with State's regular education system. Through high-level planning, forecasting, and coordination bodies regular economic development planners, education planners, public and private TVET delivery institutions, and industry identify the needs and targets of each and synergize the efforts of individual sectors and components. Therefore, it is a need for enabling similar initiatives through evidence-based assessments of requirements of skills in Punjab.



Map 8: TEVTA institutes in Bahawalpur Region

Within the Bahawalpur region, there exist 35 TEVTA institutions for both males and females: 17 in Bahawalpur, 7 in Rahim Yar Khan, and 11 in Bahawalnagar. Whereas, these institutes include Government College of Technology, GCT (M&W), Government Technical Training Center (AMTS) (M&W), Government Technical Training Institute, GTTI (M&W), and Government Vocational Training Institute (W). However, these institutes offer a variety of diploma courses such as DAE Civil, Electrical, Mechanical, Telecom, etc; and short courses for instance Home Appliances Repair, Auto Cad, Mechanist, Welder, Professional Cook, etc. While, Hunermand Naujwan Program offers training programs like CCA, Solar PV Generation, HVACR.

Similarly, the duration of diploma courses may vary from one, two, and three years; while short courses are usually for three to six months. Also, the duration of these courses varies with the type of institute: for instance, GCT institutes offer courses with sixty percent practical and forty percent theory; and GTTI institutes courses are eighty percent practical and twenty percent theory practices. Also, different practical labs like mechanist, welding, draftsman, electronics, fitter general, and computer labs are available in GTTI institutions.

All TEVTA institutions in the Bahawalpur division have several issues that lead to gaps in delivery. Additionally, these obstacles include a conventional curriculum, weak employment opportunities, inefficient data management system, non-curriculum compliant labs, weak industrial linkages, financial constraints,

limited TVET access, absence of Intl accreditation, lack of quality human resources, and perception issues. And, all these problems are linked to existing infrastructure and obsolete and old practical equipment in labs.

3.6.1. Gap Analysis of existing infrastructure available at institutes.

Following are the detail of the gap analysis of practical equipment required at the labs of GCT and GTTI institutes situated at Bahawalpur and RY. Khan districts.

There is a requirement of about 4775 quantities of dissimilar equipment in different labs in the GCT institute of Bahawalpur that cost 475 million. And, about 880 different categories quantities are missing in different labs of RY. Khan institutes and costs 29 million. Other lagging facilities include proper training of labor, competent Human Resources, and efficient machinery. The major problem that occurs due to identified gaps restricts other available resources to reach their full potential. Hence, it is necessary to address these gaps and ensure their availability. The details of lab equipment, quantity required and the total cost is enlisted in tables.

Table 22: Details of required equipment in GTTI Bahawalpur

Lab Detail	Quantity required	Total Cost Million PKR
Basic Electronics Lab	1,047	15.8
Advance Electronics Lab	1,192	62.1
Applied Electronics Lab	275	119.8
Material Testing Lab	191	3.8
Plumbing Lab	312	5.1
Drafting Lab	250	13.5
Wood Shop	349	0.5
Foundary Shop	40	0.1
Heat Engine	16	1.1
Material Testing Lab	5	3.7
Mashine Shop	25	1.4
Metal Shop	18	8.5
Cnc Lab	1,015	235.3
Welding Shop	3	0.1
Total	4,775	475.7

Table 23:Details of required equipment in GTTI RY.Khan

Lab Detail	Quantity Required	Total Cost Million
Wiring Lab	92	1.7
Basic Lab	413	12.7
Power Lab	375	14.2
Mashine Shop	97	1.1
Auto Cad Laboratory	169	9.0
Foundary Shop	480	11.0
Drafting Laboratory	112	0.4
Welding And Folding Shop	165	4.7
Woodwork Shop	149	8.5
Metrology Lab	235	15.9
Metal Shop	193	2.3
Hydrolic Machine Shop	7	12.9
Applied Thermodynamics Lab	24	33.4
Material Testing And Heat Treatment Lab	13	7.1
Practice Workshop	119	23.0
Cad Cam Lab	178	15.1
Cnc Lab	17	13.2
Total	**2838**	**186.4**

3.6.2. Provision of vocational training to educated and Out of School youth

I. Provision of Missing Facilities to TEVTA

For a trained labor force, providing opportunities to students with hands-on experience and proper facilities is a dominant feature. However, there is a lack of coordination between the departments; infrastructure and available equipment in practical labs are not according to modern technology. Also, skilled labor does not get a job in the markets due to training on obsolete and old model machinery. To train efficient labor that has productivity to compete with international standards it is required to prepare them accordingly. Thus, training methods and facilities should also be aligned. To do that, we need almost 4775 electronic units that will cost around 475.7 million PKR as mentioned in table (21)..

II. Short-Term and Long-Term training Programs for Youth (Both educated and out of school)

There is a need for enabling learning and implementation environment according to the requirement of skills in the region. For this purpose, evidence-based assessments will be an effective strategy in directing youth in the desired dimension. Thus, labor productivity programs based on specialized courses should be developed, specifically for youth. And these programs should ensure the learning levels of educated and out-of-school populations to train them accordingly. Also, teachers must update their knowledge following contemporary technology and requirements. Hence, it adds to the government's responsibility to provide modern equipment for proper training techniques.

III. Aligning TEVTA Courses with future needs of the region.

Also, mapping out the skill demands of each trade and occupation at the division level will elevate labor force productivity and employability in the economy; and allow each region to develop its competitive advantage once the skill sectors are spatially aligned. This will benefit both in the short run and long run.

Table 24: Sector Wise Costing of Interventions

Sr. No	Scheme Name	Sector	Estimated Total Cost Million
1	Establishment Business Incubation & Intelligence Units	MSME	200
2	Entrepreneurship Expansion Initiative (EEI)	MSME	100
3	Support Program for Handicrafts Artisans	MSME	100
4	Product Development Program	MSME	150
5	Provision of missing facilities to MSME (Common facilities & Utilities)	MSME	500
6	Establishment of Women Resource Centers and Incubators	MSME	50
7	Entrepreneur Sustenance Scheme (ESS)	MSME	100
8	Provision of vocational training to educated and Out of School youth	Medium & Large	150
9	Support through Punjab Rozgar Scheme (3 parts name)	Medium & Large	1800
10	Industrial Package to Provide missing facilities in Industrial Estates	Medium & Large	1000
11	Integrated Agro-industrial park	Medium & Large	45,000
12	Provision of Missing Facilities to TEVTA	Medium & Large	475
13	Short-Term and Long-Term training Programs for Youth (Both educated and out of school)	Medium & Large	1000
14	Aligning TEVTA causes with future needs of the region.	Medium & Large	500
	Total		**51,125**

3.7. Ecosystem for MSME Development

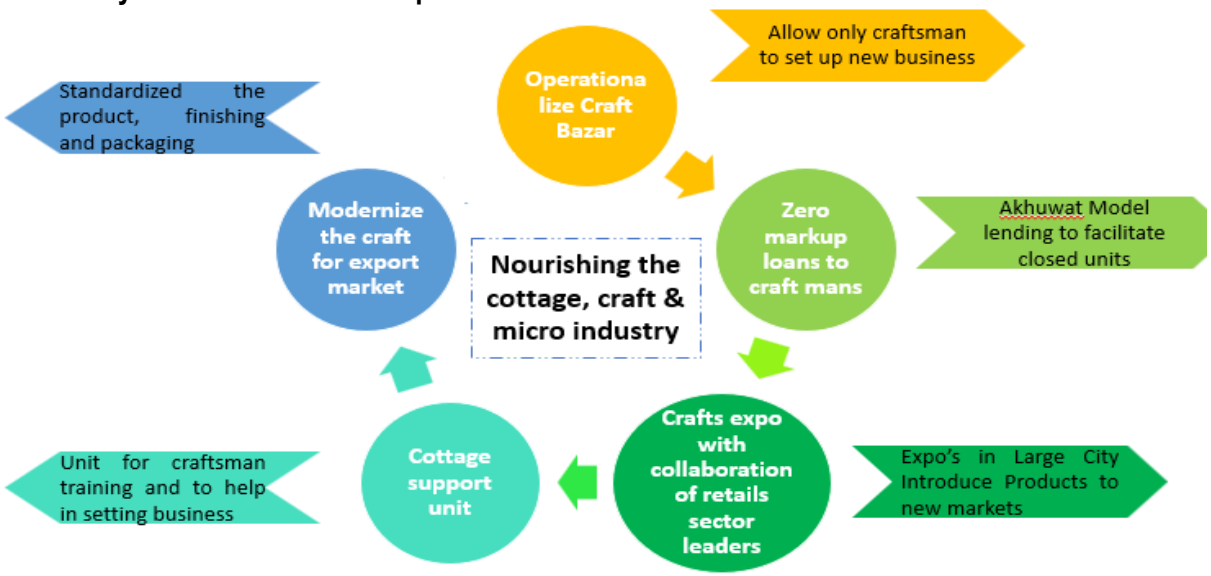


Figure 14: Ecosystem for MSME Development

Figure 14 is explaining that for the nourishment of cottage, craft, and micro-industry, an ecosystem must be developed to setup the foundation for small scale industry. This framework explains that there is a need for the operationalization of craft bazaars that can provide opportunities for a craftsman to start their businesses. There exist lack of resource and planning, and for starting up a business there is a need for monetary support that is a definite prerequisite. Therefore, assurance of this facility from sources such as Akhuwat will generate the finance at zero markup for the new and micro entrepreneur. . Furthermore, after establishment, the subsequent step is to provide a platform to these nascent businesses where they can display their products and introduce them to the markets. So, organizing large expos or providing accessibility to large markets such as Carrefour and Metro will encourage producers to stabilize their businesses more frequently. Another vital obligation is to train the labor or craftsman according to the contemporary universal setting. Likewise, standardizing packaging and product finishing will attract more customers by establishing customer confidence.

3.8. Proposed interventions

3.8.1. Entrepreneurship Expansion Initiative (EEI)

A scheme to set up entrepreneurship development clubs in educational institutes of the region is suggested, as a part of the intervention program. So that students of higher secondary education level technical and vocational institutes and universities whose age ranging from 18 and above can establish entrepreneurial

reasoning abilities. Hence, the primary purpose that it can serve is to train youth by equipping them with the skills, techniques, and confidence to act as a pioneer of the "Enterprise" for the new generation and will also inform them with available financial opportunities and potential constraints in establishing their businesses. Hence, this intends to motivate students by providing them a platform to discuss and implement ideas; to provide necessary training; and initial financial assistance.

Objective/ Aim

- Inculcate entrepreneurship potentials in emerging minds.
- Make them familiar with the industrial setup of the region.
- Encourage latent entrepreneurial talent.
- Aspire students with the attitudes, values, and skills of successful entrepreneurs at local & national level.

3.8.2. Business Incubation & Intelligence Units

The primary purpose of implementing such an intervention is to assist new entrepreneurs in developing their businesses and anticipate complications. Especially at the initial stages by providing business and technical services such as initial raw material funds, lab facilities, advisory, network, and linkages. Altogether, this will allow entrepreneurs to preserve capital and gain external support to accelerate their business growth. The primary focus should be on the development of new businesses and benefitting entrants. More strategically, a competitive environment (in each industry) can be established which will not only increase efficiency but will also introduce price benefits for the consumers. And, through the trickle-down effect, other sectors of the economy can also get advanced.

Furthermore, each targeted goal can be achieved by identifying potential areas for profitable investment for both investors and the economy. Hence, supporting and facilitating new businesses to grow up and face the market challenges through counseling, reviewing existing legislation, policies, regulations, and simplifying them for new entrants to strengthen the industrial base in the region.

Objective/ Aim:

- Assuring availability of contemporary knowledge
- Support skill and capacity building as per market requirements that will develop compatibility.

- Through mentorship explaining business planning and systematic approach towards potential challenges
- Develop financial and market linkages and introducing innovative production techniques.

3.8.3 Entrepreneur Sustenance Scheme (ESS)

Usually, entrepreneurs face difficulties at the initial stages of establishment, and therefore, it is necessary to tackle them at the right time before they completely collapse. Supporting start-ups or new businesses looking for financial, technical, and institutional support can prevent them from complete failure. Also, encouragement, training of unskilled individuals, and assisting the existing entrepreneur to innovate can ensure future progress. Hence, start-ups and new businesses looking for financial, technical, and institutional assistance should be the core of focus. Providing significant support to nascent producers will induce producer confidence and boost productivity via two main channels: maximizing efficiency and minimizing instances of the firm collapsing before reaching its maturity. This will enable new entrepreneurs will be able to compete at the national and international levels through increased support in the form of technological and financial guidance. Furthermore, the emergence of COVID-19 has affected the overall industrial sector along with other sectors of the economy. Such interventions will be helpful in mitigating these negative effects.

Proposed Interventions

Development of entrepreneurial capabilities should be taken place in following phases:

Phase 1: Startup support

- Introduced prior to commencement of commercial production.

Phase 2: Technical Support

- Introduced after commencing production on acquiring new technology.

Phase 3: Investment support

- Introduced after commencement of commercial production.

3.8.4. Product Development Program

Another important intervention in this region can be identifying and targeting potential clusters for enhanced production. Each unit in potential groups can contribute to their respective industries to become competitive

at the national level. By doing this, Small and Medium Enterprises (SMEs) initially and the exports sector, in the long run, can be a source of advantage for the economy.

The fundamental emphasis of this intervention should be to target cluster-wise goods through a uniform approach for efficient production strategy. It will also create competitive goods markets. Therefore, the overall capacity of the region can be upgraded. Also, common hindrances encountered by new producing units in clusters, such as new technology, finishing, marketing, skills, quality, access to capital, and new markets, will be tackled through strategic planning and implementation.

Proposed Interventions

- Introducing R&D department that can work on development of new products according to market requirement.
- Setting up of facility centers that will ensure testing, training center, raw material depot, effluent treatment, complementing production processes.
- Provide labor training as per demand.
- Standardizing efficient capital in all units.

3.8.5. Support Program for Handicrafts Artisans and Crafts industry (SPHA)

Artisans in Pakistan are of unique significance, encouraging them and aiding artisans to initiate self-employment can be a promising initiative of the sector, region, and overall economy. Usually, artisans who set up a micro-enterprise in the handicrafts sector include: Chunri & Cloth Dying, Khusa, Ghindi, Date leave Crafts (Chabi, morha, musla, hand fans, chitai), and clay Pottery and this is a common skill in all districts of the region. Therefore, the primary requirement of this strategy will be to assist artisans through monetary grants, conceptual guidance, and strategic expansion of their skills. Moreover, the principal elements of Fixed Capital Investment (FCI) include the cost of constructing a work shed/workshop, essential tools, equipment, machinery and accessories, and electrification. Convincingly, it can be anticipated to encourage production that will further enhance the overall income generation environment. Similarly, through e-commerce and strategic marketing, this area of industry is suggested to increase profitability.

Main Objective/ Aim

- Combine the artisans in the handicrafts sector under the ambit of a Single Scheme.
- Availing financial assistance in the form of grant assistance.

- Setting up handicraft enterprises and setting up a unit.
- Marketing at national and international levels.

3.8.6. Provision of missing facilities to MSME (Common facilities & Utilities)

Infrastructure services are necessary for efficient productivity in business and also minimize production and transportation costs. Therefore, establishing infrastructures will integrate the country with global markets and connect the world at a low cost. The remedial measures against suspected hindrances will pave the way to industrial areas generally known as Industrial Estate. Thus, not only benefit Small and Medium Enterprises (SMEs) but will improve the output of the exports sector in the long run. Therefore, establishing infrastructures will integrate the country with global markets and connect the world at a low cost. The remedial measures against suspected hindrances will pave the way to Industrial Areas generally known as Industrial Estate. Providing access to high-quality infrastructure including common facilities for packaging and standardization at competitive prices that will expand economic opportunities for products, will improve the quality of products. Hence, developing linkages that connect industries to the commercial market and provide efficient production and distribution of energy resources (such as electricity and gas supply) are main targets that can be achieved from this intervention.

Main Objective/ Aim

Provide access to high-quality infrastructure including common facilities for packaging and standardization at competitive prices that will expand economic opportunities for products, this will improve quality of products.

3.8.7. Establishment of Women Resource Centers and Incubators

For women empowerment and encouragement essential part is to financially stabilize them. To do that, develop opportunities through which they can identify their paths. Specifically, being a woman in this society and expecting her to initiate a new business requires constant encouragement, both in financial support and guidance. Therefore, establishing resources and incubations centers that are specifically focused on women will not only encourage women entrepreneurs but will also other girls to follow in their footsteps.

Proposed Interventions:

- Introduction of training for women to gain professional expertise in desired field
- Introduction of training for women to gain professional expertise in the desired field

- Guiding in legal and financial issues.
- Enabling strategic approach to target market accordingly
- Assisting in the technological development of the system.

3.9. Ecosystems of Industrial Development and different parameters

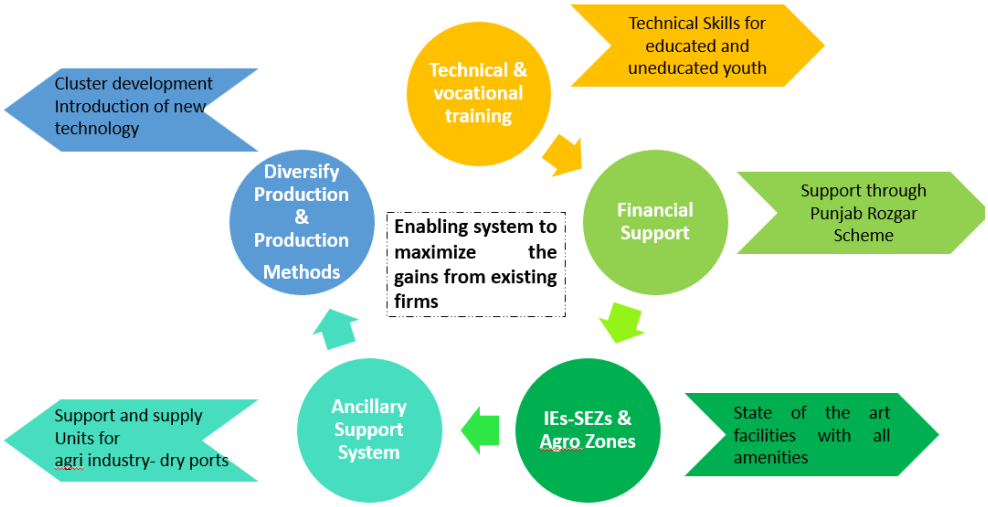


Figure 15: Ecosystem of Industrial development and different parameters.

In figure 15 above, the framework for enabling the system to maximize the gains from the existing firm is been displayed. In can be retrieved for better development of existing industry skill development is essential to train labors and this can be done through technical and vocational training for both educated and uneducated individuals. This will benefit on individual, firm, industry and economy basis and hence can be most fruitful intervention. Furthermore, the establishment of specialized economic and agro-zone will develop producer efficiency and this will lead to more competence. These specialized zones will also benefit through state of art. Also, the ancillary support system will increase efficiency and will develop support and supply agro-industry dry ports. Development of products through diverse production techniques will develop product differentiation that will also establish the development of clusters. Hence, developing this environment will benefit industrial transition.

growth of their product; make it sustainable for future growth of the economy in the Bahawalpur division.

3.9.1. Feasibility Study for integrated Agro-industrial park

The development of Agro-industrial parks is discussed as a separate component. However, it is necessary to conduct extensive feasibility for detailed assessment, cost estimation, and design specification for the success of this project.

4. Agro-Industrial Zone

The concept of agglomeration economies is based on the idea that the collective location of the firm or people in the form of cities or industries is beneficial economically as this will benefit them in terms of their efficiency and produce outcomes with lower costs as transportation costs decline. (Glaeser, 2010). Similarly, a more practical example of such economies is prevalent in the form of Agro-Industrial park (AIP). AIP can be explained as a group of industries located together to attain economies of scale and infrastructural benefits such as common roads, storage facilities, and power supply units. (Mahmoud, 2017). Moreover, the development of such a zone varies with the region as operability depends on the availability of production facilities.

4.1. Rationale

Agricultural processing can be explained as transforming, packaging, sorting or screening livestock or livestock products, agricultural commodities, or plants or plant products into goods that are used for intermediate or final consumption, including goods for nonfood use. Therefore, an essential requirement of its development is a durable food procession sector. The significance of this sector can be identified from the fact that with exact technological knowledge, wastage of perishable agricultural produce can be prevented, and the shelf life of food products can be increased. Moreover, ensuring value addition to agricultural produce, diversification, and commercialization of agriculture will lead to employment generation and more income of farmers by uplifting the economy of rural areas.

Pakistan's food processing industry is broadly categorized into the following 4 sub-sectors:

1) Value-added and frozen food processing sectors, including canned foods
2) Edible oils and fats manufacturing/processing units
3) Beverage production units
4) Bakery and confectionary manufacturing unit

4.2. Need of Agro-Processing Units/ Lost Potential of Pakistan

In the year 2003 Pakistan has a similar exporting capacity of 2.2 USD billion which is the same as that of Egypt. By the year 2018, Pakistan is capturing only 0.7 USD Billion exports and Egypt has reached attracting 2.3 USD billion exports. If Pakistan would have progressed at the same pace as Egypt then it would have been able to have at least 2.2 USD billion exports. Therefore, Pakistan's missed opportunity of exports is around 1.5 USD billion. Similarly, Peru and Vietnam who were capturing 03 and 0.4 billion USD exports in the year 2003 are gathering 3.6 and 6.6 billion USD in the year 2018.

Currently, agriculture processing is contributing 19% in the manufacturing sector Pakistan exported USD 674 million and imported USD 870 million worth of horticultural commodities. The target is to increase the export to 1.5 Billion and reduce the imports by 50% in 2 years, after the establishment of AIPs. AIPs will benefit in strengthening the economy.

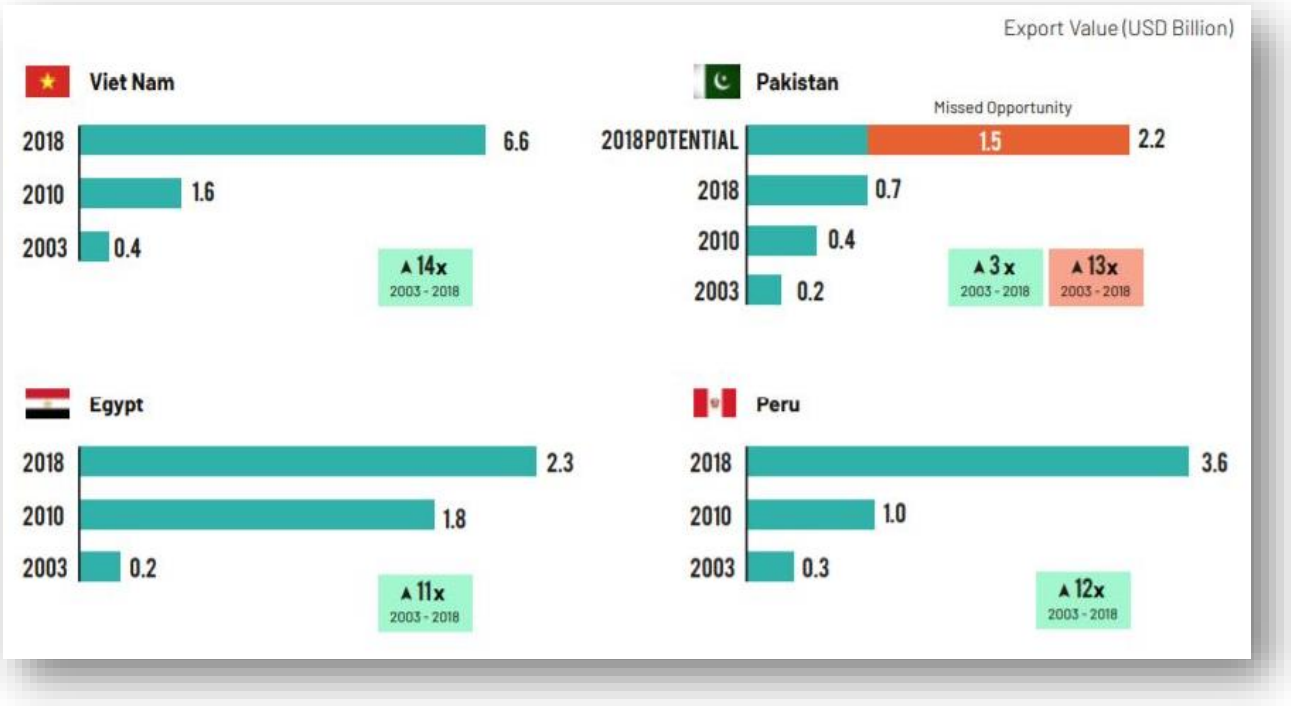


Figure 16: Export Comparison of Pakistan with Vietnam, Egypt and Peru

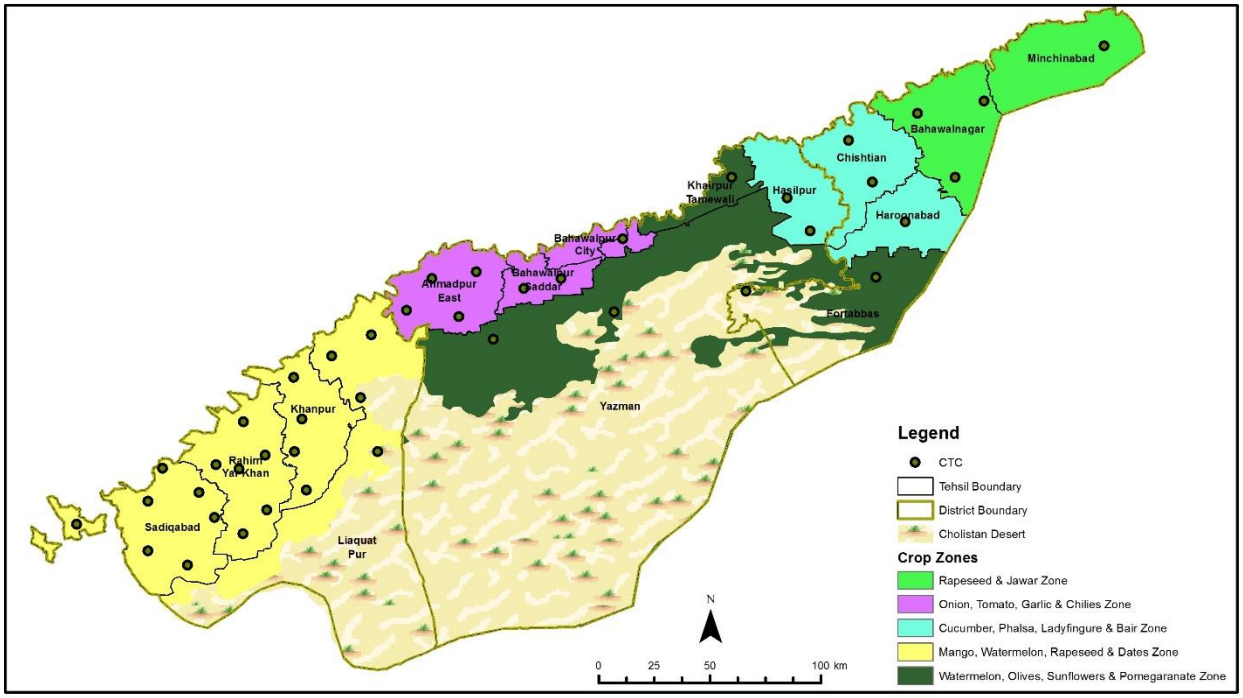
4.3. Integrated AGRO-Industrial Zone with Proposed Interventions

Bahawalpur region has potential for all three sectors of the economy i.e. agriculture, industries, and services sector. Therefore, the establishment of Agro-Industrial Parks (AIPs) can be an integrated initiative for maximum exploitation of these potentials. However, AIPs can be explained as industrial setups, that are specifically designed for value addition to agriculture products (includes both edible and non-edible items). Through these AIPs, agricultural products are processed and transformed into industrial goods, and final products are then marketed and utilized with improved storability. Hence, linkages between farms and markets are formed.

The development of AIPs is a complicated process and needs careful administration for successful implementation and fruitful outcomes. Hence, an execution structure is developed and suggested by considering technicalities at each stage of this process.

There are five Crop Clusters (CCs) that are identified on markaz level in the Bahawalpur region, as shown in map 9. These crops zones are as follows:

1. Rapeseed and Jawar zone displayed in light green color
2. Onion, tomato, garlic, and chilies zone in purple color
3. Cucumber, phalsa, ladyfinger, and bair zone in a blue display
4. Mango, watermelon, rapeseed, and dates zone shown in yellow
5. Watermelon, olive, sunflowers, and pomegranate zone is presented in dark green color



Map 9: Crop Clusters in Bahawalpur Region

Through identifying CCs, the regional and geographical concentration of targeted crops is highlighted. Also, specialization techniques for these identified crops in the form of preproduction, production post-harvest management, logistics, marketing, and branding are feasible to develop and implement. Farmers can form their groups in the shape of Farmer Producer Organization (FPOs)/ Farmers Producer Company (FPCs), these groups will be helpful for effective communication between farmers and administrative agencies. And, any anticipated or prevailing problem is predicted to be identified before it gets worsened. Accordingly, the maximum harvest of established settlements can be assured and will be available for further processing. All these CCs are proposed to be monitored at the cluster level through Cluster Transformation Centers (CTCs), where agriculture officers will be responsible for the supervision of each task.

Furthermore, CTCs are the coordinating entity between industry and agriculture. In the next step, the transformation of agricultural products into industrial products will take place. CTCs will also ensure the quality and quantity of the system and identify what quality raw material (agriculture) is exemplary for the production of the desired industrial product. And, effective production both on the side of agriculture and industry will lead to healthy and reliable linkages at the very initial stages of strategic implementation will be developed.

Moreover, another necessity of this is farming support to the agriculture side. This task will be performed by CTCs and will be providing input support centers to farmers by ensuring the seed's quality and other material recourses such as water supply and maintenance of the environment. Also, an essential prerequisite is to warrant financing facilities in the form of Kissan cards and subside programs to farmers.

On the other hand, surveillance for the industrial sector is also essential. CTCs will identify the resources that are necessary for efficient performance. And, this will include assuring the worker's capacity and competence following the requirement. Similarly, introducing new production methods and techniques can lead to competence with the international world. Moreover, providing logistic support that will plan and implement strategies for effective transportability and storing goods from point of production to consumption should be considered because this is the most technical stage of the whole process.

Hence, the process of planning and executing the efficient transportation and storage of goods demands intense reasoning. The goal of logistics is to meet customer requirements in a timely and cost-effective manner.

4.4. CETP-Utilities Infrastructure-SWM-R&D-M&E

The transformation of agriculture products into industrial products require the establishment of pre-processing zones, processing zone, and post-processing zones.

4.4.1. Pre-Processing zones

For standardizing and valuable production, there are 5 steps proposed in the screening and evaluation process to ensure the quality of produced products by warranting types of inputs used.

In the pre-processing zone, the first step is to grade agriculture products through specialized units, which will screen if the provided product is valuable for the desired level of production or not. After proper testing and assessment, the second step of the evaluation process will include segregation units that will separate useful material from non-useful ones. The third step will be ensuring the quality of segregated inputs in quality testing labs, which will examine the quality of inputs. In the fourth step, the Center for Standardization

will provide approval by tagging as a sign of quality assurance. These raw materials are delicate products in terms of their shelf life, which means it is necessary to protect them from rotting and hence suitable storage facilities that provide a required environment and retain them in their desirable condition. Therefore, the last step will be to maintain proper storage facilities.

4.4.2. Processing Zones

After proper standardizing, processing zones will start their function. In these zones, the final product will be assembled that should be ready for consumption. Moreover, cutting-edge technology must be appreciated for these units; which is the requirement for supplying goods to global markets; and this technology needs constant up-gradation with the industrial transformation of the international world. The next step after complete production is the quality assurance that will undergo screening of produced goods. Furthermore, production standard units will inspect the production environment, which will reduce the instances of mal production. And, packaging facilities will undergo packaging of goods according to required standards. Hence, this will lead to the production of internationally competitive goods that have undergone vigilant inspection.

4.4.3. Post Processing Zones

Post-processing zones will start their task after the complete production stage. In this phase, specialized labs will be instituted and will certify the final good as standard quality. Also, these final product needs market intelligence units that convey them to targeted consumers through proper marketing channels. Additionally, the need for supply chain centers will assure timely supply with maintained quality by connecting the retail wholesale market with the production centers. Similarly, business development activities such as expos and reaching out to display centers will capture new business and assure supply to the consumers with the demand for the developed project.

4.5. Phases of Development

For the development of agro-zones, there will be three phases that are divided into ten years. These phases are shown in Table 25, and discuss the targeted production area, timeline, and cost financing strategy.

Table 25: Proposed Phases of Development for AIPs

	Produces	Time	Cost
Phase I	Fruits	Year 1 to 6	30 Billion (20 Billion through Government Spending-10 Billion through private sector)
Phase II	Vegetables	Year 6 to 8	15 Billion (5 Billion through Government Spending-10 Billion through private sector)
Phase III	Crops	Year 9 to 10	15 Billion (5 Billion through Government Spending-10 Billion through private sector)

In each phase, there are a few common requirements. For instance, proposed CTCs will assure the supply of quality raw materials and farm-to-market networks will be established that will ease access to farmers, improve connectivity and reduce the time for transferring material and goods. Through this, there will be the expansion of entrepreneurial culture with the supply and the spread of quality skillset. That will also require technology adoption and operationalization of the zone. And finally, advancement in retail opportunities will be formed.

Besides, fruits are a relatively delicate commodity as compared to vegetables and crops. Therefore, developing a plan for an efficient fruit production zone in the first phase, and expanding it to vegetables and crops in the latter two stages will be a tactical approach. Because this way, it can be expected to have a spillover effect for fruits and crops that will lead to efficient development through the private sector with little or no intervention of public commands.

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Appendix

Table 26: Large Scale Industries Sectoral and Industrial Overview

Industries	% Share in Large Scale Sector	Employment % Share in Large Scale Sector	% Share in own Industry	Employment % Share own Industry
Sugar	31.25%	13.07%	100%	100%
Fertilizers and Nitrogen Compounds	12.50%	22.89%	50.00%	99.58%
Preparation and Spinning of Textile Fibers	12.50%	5.52%	66.67%	98.12%
Clay Building Materials	6.25%	46.96%	0.46%	61.78%
Cordage, Rope, Twine and Netting	6.25%	2.11%	100.00%	100%
Dairy Products	6.25%	2.79%	9.09%	92.69%
Other Food Products N.E.C.	6.25%	1.28%	12.50%	76.77%
Soap and Detergents, Cleaning and Polishing Preparations, Perfumes and Toilet Preparations	6.25%	1.79%	12.50%	90.99%
Soft Drinks; Production of Mineral Waters and Other Bottled Waters	6.25%	1.48%	14.29%	86.42%
Weaving of Textiles	6.25%	2.11%	16.67%	95.42%
Total	**100%**	**100%**	**1.54%**	**56%**

Table 27: Medium Scale Industries Sectoral and Industrial Overview

Industries	% Share in Medium Scale Sector	Employment % Share in Medium-Scale Sector	% Share in Industry	Employment % Share in Industry
Articles Of Concrete, Cement And Plaster	1.85%	2.99%	4.55%	37.41%
Bakery Products	1.85%	1.20%	0.84%	6.79%
Basic Iron And Steel	1.85%	2.39%	14.29%	65.22%
Clay Building Materials	51.85%	44.09%	12.79%	12.30%
Grain Mill Products	11.11%	7.81%	3.45%	12.94%
Other Electrical Equipment	1.85%	4.98%	50.00%	95.06%
Other Textiles N.E.C.	7.41%	4.72%	30.77%	51.30%
Pesticides And Other Agrochemical Products	1.85%	1.30%	16.67%	58.04%
Pharmaceuticals, Medicinal Chemical And Botanical Products	1.85%	2.41%	33.33%	78.57%
Plastics Products	1.85%	4.78%	12.50%	87.91%
Prepared Animal Feeds	1.85%	2.99%	20.00%	61.22%

Rubber Tyres And Tubes; Retreating And Rebuilding Of Rubber Tyres	1.85%	1.59%	100.00%	100.00%
Vegetable And Animal Oils And Fats	12.96%	18.75%	2.90%	23.20%
Total	**100.00%**	**100%**	**5.21%**	**12%**

Table 28:Small Scale Industries Sectoral and Industrial Overview

Industries	% Share in Small Scale Sector	Employment % Share in Small Scale Sector	% Share in Industry	Employment % Share in Industry
Agricultural And Forestry Machinery	2.07%	1.29%	100.00%	100.00%
Articles Of Concrete, Cement And Plaster	2.17%	1.85%	95.45%	62.59%
Bakery Products	12.22%	6.09%	99.16%	93.21%
Basic Chemicals	0.31%	0.24%	100.00%	100.00%
Basic Iron And Steel	0.62%	0.47%	85.71%	34.78%
Bodies (Coachwork); For Motor Vehicles; Manufacture Trailers And Semi-Trailers	0.21%	0.07%	100.00%	100.00%
Clay Building Materials	19.67%	34.45%	86.76%	25.92%
Corrugated Paper And Paperboard And Of	0.31%	0.33%	100.00%	100.00%

Containers Of Paper And Paper Board				
Cutting, Shaping And Finishing Of Stone	6.11%	1.74%	100.00%	100.00%
Dairy Products	1.04%	0.38%	90.91%	7.31%
Fertilizers And Nitrogen Compounds	0.21%	0.17%	50.00%	0.42%
Furniture	4.24%	2.75%	100.00%	100.00%
Grain Mill Products	17.39%	19.49%	96.55%	87.06%
Jewellery And Related Articles	0.21%	0.03%	100.00%	100.00%
Medical And Dental Instruments And Supplies	0.10%	0.05%	100.00%	100.00%
Motorcycles	0.21%	0.44%	100.00%	100.00%
Other Articles Of Paper And Paperboard	0.10%	0.18%	100.00%	100.00%
Other Chemical Products N.E.C.	0.31%	0.30%	100.00%	100.00%
Other Electrical Equipment	0.10%	0.10%	50.00%	4.94%
Other Fabricated Metal Products N.E.C.	1.04%	0.54%	100.00%	100.00%
Other Food Products N.E.C.	0.72%	0.68%	87.50%	23.23%
Other General-Purpose Machinery	0.10%	0.04%	100.00%	100.00%

Other Manufacturing N.E.C.	0.10%	0.12%	100.00%	100.00%
Other Non-Metallic Mineral Products N.E.C.	0.10%	0.11%	100.00%	100.00%
Other Textiles N.E.C.	0.93%	1.66%	69.23%	48.70%
Other Transport Equipment N.E.C.	0.10%	0.08%	100.00%	100.00%
Paints, Varnishes And Similar Coatings, Printing Ink And Mastics	0.10%	0.07%	100.00%	100.00%
Pesticides And Other Agrochemical Products	0.52%	0.35%	83.33%	41.96%
Pharmaceuticals, Medicinal Chemical And Botanical Products	0.21%	0.24%	66.67%	21.43%
Plastics Products	0.72%	0.24%	87.50%	12.09%
Preparation And Spinning Of Textile Fibres	0.10%	0.18%	33.33%	1.88%
Prepared Animal Feeds	0.41%	0.70%	80.00%	38.78%
Processing And Preserving Of Fruit And Vegetables	0.31%	0.24%	100.00%	100.00%
Refined Petroleum Products	0.10%	0.07%	100.00%	100.00%
Soap And Detergents, Cleaning And Polishing Preparations, Perfumes And Toilet Preparations	0.72%	0.31%	87.50%	9.01%

Soft Drinks; Production Of Mineral Waters And Other Bottled Waters	0.62%	0.41%	85.71%	13.58%
Starches And Starch Products	0.10%	0.04%	100.00%	100.00%
Structural Metal Products	0.52%	0.20%	100.00%	100.00%
Tobacco Products	0.10%	0.10%	100.00%	100.00%
Vegetable And Animal Oils And Fats	24.22%	23.02%	97.10%	76.80%
Weaving Of Textiles	0.52%	0.18%	83.33%	4.58%
Grand Total	100.00%	100%	93.24%	32%