

2021

Food Processing Sector in Pakistan



Turn Potential into Profit



Small and Medium Enterprises Development Authority (SMEDA)
Ministry of Industries and Production (Mol&P) Government of
Pakistan

4th Floor Building No. 3, Aiwan-e-Iqbal Complex, Egerton Road Lahore
www.smeda.org.pk

Phone: (+92 42) 111 111 456

TABLE OF CONTENTS

| | |
|---|----|
| 1. Introduction..... | 1 |
| 2. Global Agro Food Scenario..... | 6 |
| 3. Agro Food Industry in Pakistan..... | 10 |
| 4. Fresh Produce Industry..... | 18 |
| 5. Juice & Beverage Industry..... | 29 |
| 6. Cereals Processing..... | 35 |
| 7. Bakery & Confectionary..... | 38 |
| 8. Meat Processing..... | 42 |
| 9. Canned & Processed Food..... | 47 |
| 10. Frozen Food Industry..... | 51 |
| 11. Oil & Ghee Industry..... | 54 |
| 12. Spices & Condiments..... | 57 |
| 13. Food Safety..... | 61 |
| 14. Food Laws, regulations & Authorities..... | 66 |
| 15. Certifications & Standards..... | 73 |

Disclaimer

Information provided in this document is for general purpose and collected through secondary data sources. The reader is advised to further deliberate on given information according to the circumstances. SMEDA does not hold any liability regarding outcome of the venture after use of this document.

1. INTRODUCTION

The Food Industry is a complex, global collective of diverse businesses that supply most of the food consumed by the world population. Only subsistence farmers, those who survive on what they grow, and hunter-gatherers can be considered outside of the scope of the modern food industry.

The food Industry includes:

- Agriculture: raising of crops and livestock, and seafood
- Manufacturing: agro-chemicals, agricultural construction, farm machinery and supplies and seed, etc.
- Food processing: preparation of fresh products for market, and manufacture of prepared food products
- Marketing: promotion of generic products (e.g., milk board), new products, advertising, marketing campaigns, packaging, public relations, etc.
- Wholesale and distribution: logistics, transportation, warehousing
- Foodservice (which includes Catering)
- Grocery, farmers' markets, public markets and other retailing
- Regulation: local, regional, national, and international rules and regulations for food production and sale, including food quality, food security, food safety, marketing/advertising, and industry lobbying activities
- Education: academic, consultancy, vocational
- Research and development: food technology
- Financial services: credit, insurance

It is challenging to find an inclusive way to cover all aspects of food production and sale so in short the whole food industry can be defined as – from farming and food production, packaging and distribution, to retail and catering¹.

The Economic Research Service of the USDA uses the term food system to describe the same thing, "The U.S. food system is a complex network of farmers and the industries that link to them. Those links include makers of farm equipment and chemicals as well as firms that provide services to agribusinesses, such as providers of transportation and financial services. The system also includes the food marketing industries that link farms to consumers, and which include food and fiber processors, wholesalers, retailers, and foodservice establishments².

¹ "Industry". Food Standards Agency (UK).

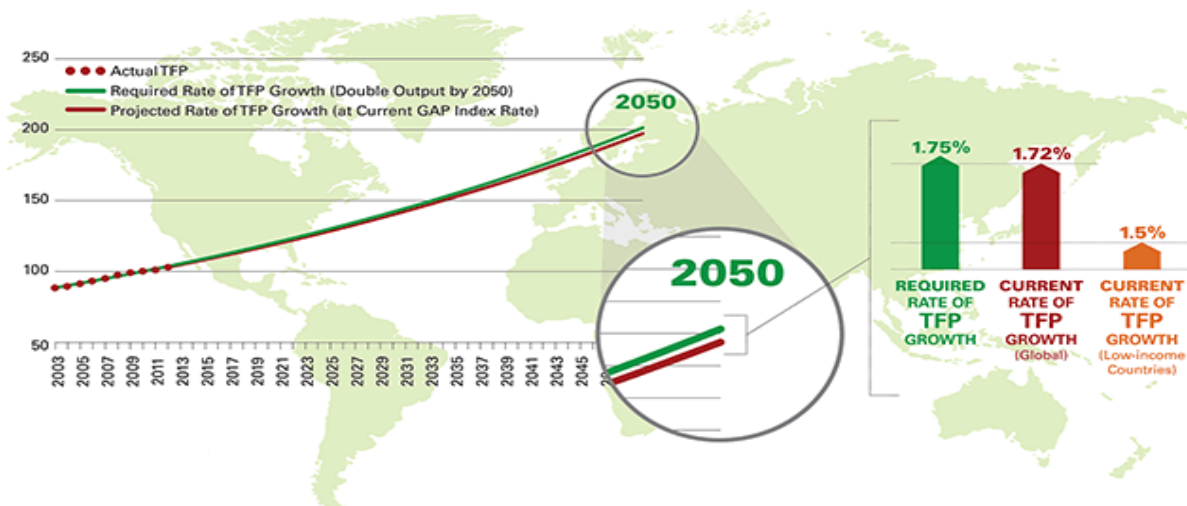
² "Food market structures: Overview". Economic Research Service (USDA).

The food and beverage processing industry is the 2nd largest industry of Pakistan after textiles, accounting for 27% of the value-added production and 16% of employment in the manufacturing sector.

- Food processing accounted for an annual average of \$223.5m in FDI from 2012-2018.
- 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

Food processing companies are further categorized into either informal / cottage establishments or formal establishments. The three major industry groups are (1) frozen food (2) value addition in major food crops and (3) fruits, vegetables and intermediate products. Most of the food industry in Pakistan is concentrated in Punjab (60%) followed by Sindh (30%), KPK (6%), Baluchistan (2%) and ICT (2%). In total, there are approximately 2500+ food processing units in Pakistan. Pakistan was awarded the Generalized Scheme of Preferences (GSP) Plus Status (Zero to Low Duty) by the European Union in 2014 which has the potential to greatly uplift the exports of processed food products³.

THE GLOBAL AGRICULTURAL PRODUCTIVITY (GAP) INDEX™



Source: Food Demand Index is from Global Harvest Initiative (GHI) (2015);
Agricultural Output from TFP Growth is from USDA Economic Research Service (2015).

³ <https://pakistan.um.dk/en/the-trade-council/sectors-in-focus>

1.1 Agriculture and Agronomy

Agriculture is the process of producing food, feeding products, fiber and other desired products by the cultivation of certain plants and the raising of domesticated animals (livestock). The practice of agriculture is also known as "farming". Scientists, inventors, and others devoted to improving farming methods and implements are also said to be engaged in agriculture. 1 in 3 people worldwide are employed in agriculture,⁴ yet it only contributes 3% to global GDP⁵.

Agronomy is the science and technology of producing and using plants for food, fuel, fiber, and land reclamation. Agronomy encompasses work in the areas of plant genetics, plant physiology, meteorology, and soil science. Agronomy is the application of a combination of sciences. Agronomists today are involved with many issues including producing food, creating healthier food, managing environmental impact of agriculture, and extracting energy from plants⁶.

1.2 Food Processing

Food processing includes the methods and techniques used to transform raw ingredients into food for human consumption. Food processing takes clean, harvested or slaughtered and butchered components and uses them to produce marketable food products. There are several different ways in which food can be produced.

One off Production:

This method is used when customers make an order for something to be made to their own specifications, for example a wedding cake. The making of one-off products could take days depending on how intricate the design is.

Batch Production:

This method is used when the size of the market for a product is not clear, and where there is a range within a product line. A certain number of the same goods will be produced to make up a batch or run, for example a bakery may bake a limited number of cupcakes. This method involves estimating consumer demand.

Mass Production:

This method is used when there is a mass market for a large number of identical products, for example chocolate bars, ready meals and canned food. The product passes from one stage of production to another along a production line.

⁴ "Labour" (PDF). *FAO.org. The Food and Agriculture Organization of the United Nations*. Retrieved 15 May 2015.

⁵ "Macroeconomy" (PDF). *FAO.org. The Food and Agriculture Organization of the United Nations*. Retrieved 15 May 2015.

⁶ "I'm An Agronomist!" *Imanagronomist.net*. Retrieved 2013-05-02.



Just-in-time (JIT) Production:

This method of production is mainly used in restaurants. All components of the product are available in-house and the customer chooses what they want in the product. It is then prepared in a kitchen, or in front of the buyer as in sandwich delicatessens, pizzerias, and sushi bars.

1.3 Marketing and Sales

As consumers grow increasingly removed from food production, the role of product creation, advertising, and publicity become the primary vehicles for information about food. With processed food as the dominant category, marketers have almost infinite possibilities in product creation. The sale of food commodities are largely comprises of following key functions.

Wholesale and Distribution

A vast global cargo network connects the numerous parts of the industry. These include suppliers, manufacturers, warehouse owners, retailers and the end consumers. Wholesale markets for fresh food products have tended to decline in importance in urbanizing countries, including Latin America and some Asian countries as a result of the growth of supermarkets, which procure directly from farmers or through preferred suppliers, rather than going through markets.

The constant and uninterrupted flow of product from distribution centers to store locations is a critical link in food industry operations. Distribution centers run more efficiently, throughput can be increased, costs can be lowered, and manpower better utilized if the proper steps are taken when setting up a material handling system in a warehouse⁷.

RETAIL

With worldwide urbanization⁸ food buying is increasingly removed from food production. During the 20th century, the supermarket became the defining retail element of the food industry. There, tens of thousands of products are gathered in one location, in continuous, year-round supply.

Food preparation is another area where the change in recent decades has been dramatic. Today, two food industry sectors are in apparent competition for the retail food dollar. The grocery industry sells fresh and largely raw products for consumers to use as ingredients in home cooking. The food service industry by contrast offers prepared food, either as finished

⁷ "Boosting efficiency at the DC". Grocery Headquarters. Retrieved February 2013.

⁸ "World Urbanization Prospects: The 2003 Revision". Department of Economic and Social Affairs, Population Division (United Nations).



products, or as partially prepared components for final "assembly". Restaurants, cafes, bakeries and mobile food trucks provide opportunities for consumers to purchase food.

1.4 Regulations

Since World War II, agriculture in the United States and the entire national food system in its entirety has been characterized by models that focus on monetary profitability at the expense of social and environmental integrity.⁹

The Pure Food Laws (PFL-1963) is the basis for the existing trade-related food quality and safety legislative framework in the country. It covers 104 food items falling under nine broad categories: milk and milk products, edible oils and fat products, beverages, food grains and cereals, starchy food, spices and condiments, sweetening agents, fruits and vegetables and miscellaneous food products. These regulations address purity issues in raw food and deal with additives, food preservatives, food and synthetic colors, antioxidants, and heavy metals.

1.5 Food Industry Technologies

Modern food production is defined by sophisticated technologies. These include many areas. Agricultural machinery, originally led by the tractor, has practically eliminated human labor in many areas of production. Biotechnology is driving much change, in areas as diverse as agrochemicals, plant breeding and food processing. Many other types of technology are also involved, to the point where it is hard to find an area that does not have a direct impact on the food industry. As in other fields, computer technology is also a central force, with computer networks and specialized software providing the support infrastructure to allow global movement of the myriad components involved.

1.6 Labor and Education

Until the last 100 years, agriculture was labor intensive. Farming was a common occupation and millions of people were involved in food production. Farmers, largely trained from generation to generation, carried on the family business. The food industry as a complex whole requires an incredibly wide range of skills. Several hundred occupation types exist within the food industry.

The food and beverage processing industry is the 2nd largest industry of Pakistan after textiles, accounting for 27% of the value-added production and 16% of employment in the manufacturing sector.

⁹ Schattman, Rachel. "*Sustainable Food Sourcing and Distribution in the Vermont-Regional Food System*" (PDF). Retrieved 22 January 2017.



2. GLOBAL AGRO-FOOD SCENARIO

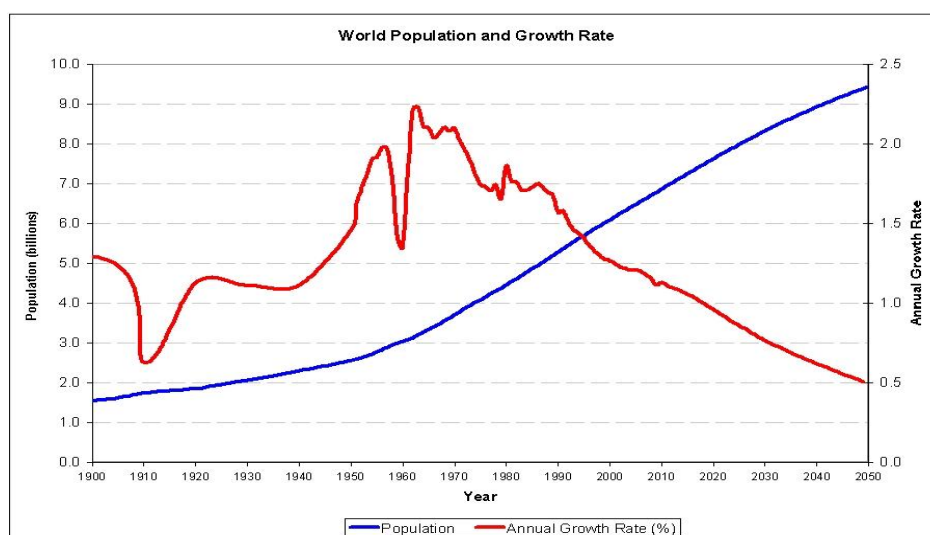
Agriculture in the 21st century faces multiple challenges: it has to produce more food and fiber to feed a growing population with a smaller rural Labour force, more feedstock's for a potentially huge bioenergy market, contribute to overall development in the many agriculture-dependent developing countries, adopt more efficient and sustainable production methods and adapt to climate change.

2.1 Food Demand & Production

Over the last century, the global population has quadrupled. In 1915, there were 1.8 billion people in the world. Today, according to the most recent estimate by the UN¹⁰, there are 7.3 billion people — and we may reach 9.7 billion by 2050. This growth, along with rising incomes in developing countries (which cause dietary changes such as eating more protein and meat) are driving up global food demand. Food demand is expected to increase anywhere between 59% to 98% by 2050. This will shape agricultural markets in ways we have not seen before. Farmers worldwide will need to increase crop production, either by increasing the amount of agricultural land to grow crops or by enhancing productivity on existing agricultural lands through fertilizer and irrigation and adopting new methods like precision farming.

However, the ecological and social trade-offs of clearing more land for agriculture are often high, particularly in the tropics. And right now, crop yields — the amount of crops harvested per unit of land cultivated — are growing too slowly to meet the forecasted demand for food.

Figure: Global Population Growth Rate over a Period of 50 Years



¹⁰ https://population.un.org/wpp/publications/files/key_findings_wpp_2015.pdf

The projections show that feeding a world population of 9.1 billion people in 2050 would require raising overall food production by some 70 percent between 2005/07 and 2050. Production in the developing countries would need to almost double. This implies significant increases in the production of several key commodities. Annual cereal production, for instance, would have to grow by almost one billion tonnes, meat production by over 200 million tonnes to a total of 470 million tonnes in 2050, 72 percent of which in the developing countries, up from the 58 percent today. Feeding the world population adequately would also mean producing the kinds of foods that are lacking to ensure nutrition security.

2.2 International Trade

The international trade of food is growing as countries rely on each other to secure an adequate and varied food supply through the import and export of food products. The opportunities for more growth are encouraged through free international trade on the basis of the Uruguay Round agreements and the establishment of WTO. Countries will have improved access to export markets, but this improved access will be accompanied by greater competition and the need to ensure confidence in the safety of the food supply. This is particularly challenging to developing countries, where quality assurance systems in the food industry and food control systems should be strengthened. Much therefore needs to be done so that all countries can take full advantage of new possibilities for free international trade and so that the comparative advantages in each country can be exploited to produce various food products in a cost-effective way with attention to improved food quality and safety.

2.3 Natural Resources

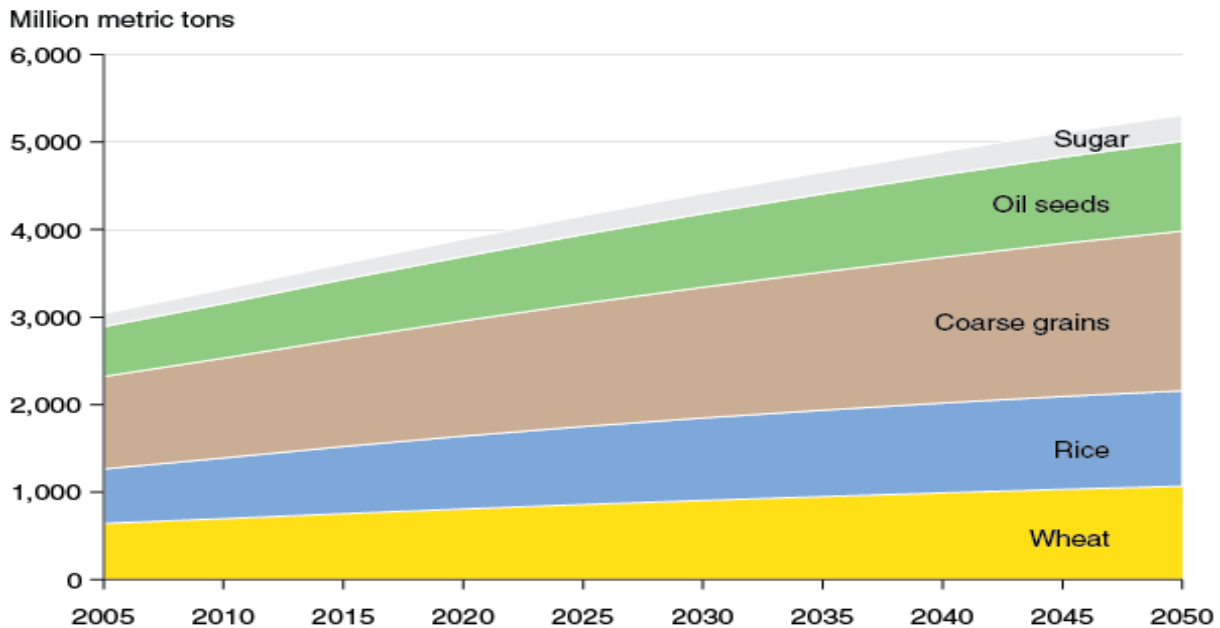
Ninety percent of the growth in crop production globally (80 percent in developing countries) is expected to come from higher yields and increased cropping intensity, with the remainder coming from land expansion. Arable land would expand by some 70 million ha (or less than 5 percent), with the expansion in developing countries by about 120 million ha (or 12 percent) being offset by a decline of some 50 million ha (or 8 percent) in the developed countries. Almost all of the land expansion in developing countries would take place in sub-Saharan Africa and Latin America. Land equipped for irrigation would expand by some 32 million ha (11 percent), while harvested irrigated land would expand by 17 percent. All of this increase would be in the developing countries. Due to a slowly improving efficiency in water use and a decline in the area under rice (which is relatively intensive in water use), water withdrawals for irrigation would grow at a slower pace but still increase by almost 11 percent (or some 286 cubic km) by 2050. The pressure on renewable water resources from irrigation would remain severe and could even increase slightly in several countries in the Near East/North Africa and South Asia. Crop yields would continue to grow but at a slower rate than in the past. This process of decelerating growth has already been under way for



some time. On average, annual crop yield growth rate over the projection period would be about half (0.8 percent) of its historical growth rate (1.7 percent; 0.9 and 2.1 percent for the developing countries). Cereal yield growth would slow down to 0.7 percent per annum (0.8 percent in developing countries), and average cereal yield would by 2050 reach some 4.3 tons/ha, up from 3.2 tons/ha at present.

Figure: Global Crop Consumption over a Period of 50 Years

World consumption of major field crops is projected to increase through 2050



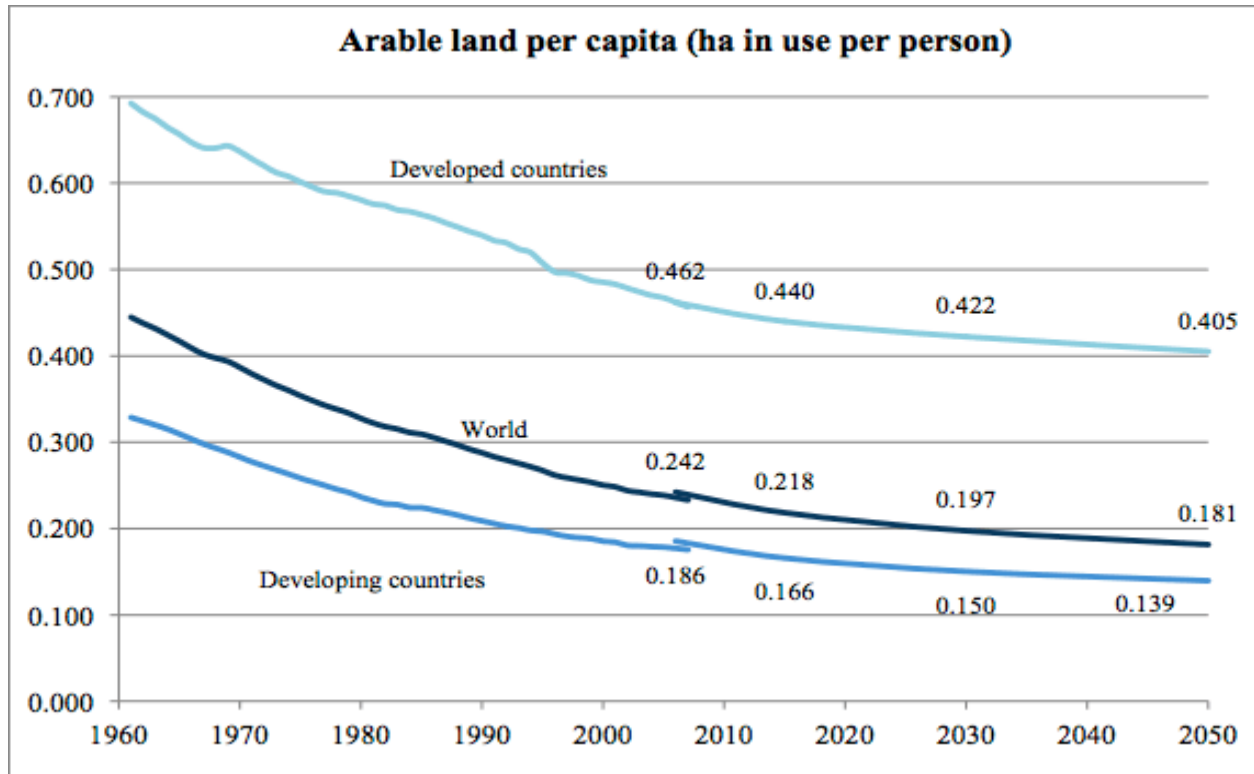
Source: USDA, Economic Research Service using Future Agricultural Resources Model reference scenario.

The Global Agro-Ecological Zone study shows that there are still ample land resources with potential for crop production available, but this result needs to be heavily qualified. Much of the suitable land not yet in use is concentrated in a few countries in Latin America and sub-Saharan Africa, but many countries with growing rural populations in these regions are extremely land-scarce, and much of the potential land is suitable for growing only a few crops that are not necessarily those for which there is the highest demand. Also much of the land not yet in use suffers from constraints (chemical, physical, endemic diseases, lack of infrastructure, etc.) that cannot easily be overcome or that it is not economically viable to do so. Part of the land is forested, protected or subject to expanding urban settlements.

Overall, however, it is fair to say that although there is a number of countries (in particular in the Near East / North Africa and South Asia) that have reached the limits of land available, on a global scale there are still sufficient land resources to feed the world population for the

foreseeable future, provided that the investments required to develop these resources are made and the neglect of recent decades in the agricultural research and development effort is reversed.

Figure: Arable land over the period of 50 years



Source: 2009. *High Level Expert Forum – how to feed the world in 2050*. Rome: Office of the Director, Agricultural Development Economics Division, Economic & Social Development Department.

3. AGRO FOOD INDUSTRY IN PAKISTAN

Agriculture sector is a vital component of Pakistan's economy as it provides the raw materials to down the line industries and helps in poverty alleviation. This sector contributed 19.8 percent in GDP and it remains by far the largest employer absorbing 42.3 percent of the country's total labour force. The agriculture sector growth is contingent on favorable weather conditions. There is a strong relationship between agriculture and climate—temperature, precipitation, floods and other aspects of weather that finally affect economic performance including agriculture production, commodity prices and finally economic growth. The emerging challenges of national food security and climate change have shifted the policy focus globally towards the development of agriculture sector during past few years. The high potential of this sector in earning valuable foreign exchange has been greatly realized through taping the potential in value addition sectors. Pakistan's agriculture community consists of small farmers having various limitations in their day to day farming practices that have been translated into the fact that per yield level in Pakistan has been graded in the lower to middle ranged economy fulfilling the propensity to cater the food requirements of its growing population and with current pace of development envisages to slip to the lower ranged economies having ability to cater the nutritional needs of its population by the year 2030.

During FY 2016, the performance of agriculture sector as a whole remained dismal as it witnessed a negative growth of 0.19 percent against 2.53 percent growth during the same period last year. The growth of crops declined by 6.25 percent, while the other sub component of Agriculture sector like Livestock, Forestry and Fishing posted positive growth of 3.63 percent, 8.84 percent and 3.25 percent, respectively. The growth of sub Sector of crops included important crops, other crops and cotton ginning remained negative as it posted a growth of -7.18 percent, -0.31 percent and -21.26 percent which impacted negatively on crops as a result became the reason of negative growth of Agriculture sector. The last negative growth in Agriculture was witnessed in 2000-01, when agriculture growth declined to 2.18 percent. Important crops having a share of 23.55 percent in agricultural value added has witnessed negative growth of 7.18 percent on account of large decline in cotton production (27.83 percent), rice production (2.74 percent) and maize production (0.35 percent) during 2015-16 against negative growth of 0.52 percent during the same period of last year. While only wheat and sugarcane production witnessed a positive growth of 1.58 percent and 4.22 percent respectively, as compared to last year. Other crops contributed 11.36 percent in value addition of agriculture witnessed a decline of 0.31 percent during 2015- 16 against positive growth of 3.09 percent during the same period last year due to decline in the production of pulses, fruits and oilseeds posting negative growth of 12.49 percent, 2.48 percent and 9.56 percent, respectively. With drop in cotton production by around 27.83 percent this year the Cotton ginning having a share of 2.32



percent in value addition of agriculture has suffered badly and posted a negative growth of 21.26 percent compared to 7.24 percent growth during the same period last year. The Livestock sector having contribution of 58.55 percent in the agriculture recorded a positive growth of 3.63 percent during 2015-16 compared to 3.99 percent growth during the same period last year. The Fishing sector having contribution of 2.17 percent in agriculture value addition recorded a growth of 3.25 percent compared to 5.75 percent growth of last year. Forestry sector having contribution of 2.06 in the agriculture value addition posted a growth of 8.84 percent this year as compared to the negative growth of 10.43 percent last year.

3.1 Pakistan's advancing edge:

- Pakistan ranks 5th in the Muslim World and 20th worldwide in farm output.
- World's 5th largest milk producer
- Pakistan is one of the world's largest producers and suppliers of the following:
 - i. Chickpea (2nd)
 - ii. Apricot (4th)
 - iii. Sugarcane (4th)
 - iv. Onion (5th)
 - v. Date Palm (6th)
 - vi. Milk (5th)
 - vii. Mango (3rd)
 - viii. Rice (8th)
 - ix. Wheat (9th)
 - x. Oranges (10th)

Pakistan's principal natural resources are arable land and water. About 25% of Pakistan's total land area is under cultivation and is watered by one of the largest irrigation systems in the world. Pakistan irrigates three times more acres than Russia. Agriculture accounts for about 23% of GDP and employs about 44% of the labor force.

The Food and its allied products industry is considered Pakistan's largest industry and is believed to account for 27% of its value-added production, while 16% of the total employment by the manufacturing sector. It is estimated that in Pakistan there may be around 80,000 small businesses and more than 2 million micro-enterprises many of which are food manufacturers. Many of the SMEs and micro-enterprises are in rural areas and fall into the category of food processors, depending heavily on agricultural raw materials and poorly skilled non-farm labor. About 40% of these small businesses are in the milling sub-sector (wheat and rice).

The foremost issue faced by Pakistan's agro food industry is of traditional approach prevailing and no advances in modern technology and innovations. The Industry is highly labor intensive and so the sector is a major employer and this employment pays low wages and uses the skills of the most ill-educated. Lack of integration from the farmer to the consumer along the supply chain is the principal reason why Pakistan food processors are uncompetitive compared with overseas companies. About 75% of the rural-based food manufacturers are in the so-called informal sector. This informal economy is unregulated and finds difficulty in accessing essential raw materials and other resources especially



finance skills, knowledge and management. Marketing and quality (especially hygiene) standards are specially lacking thus affecting the overall sales and access to international markets. Inability to manage the raw materials and also the poor supply chain management skills leaves a gap. Erratic inputs and poor labor skills in particular supplies of potable water often present problems.

Poor financial support is also one of the major constraints, company's report that commercial banks often fail to understand that their businesses depend on the natural environment, so that credit is extended or only short periods of time. Poor technical choices and a lack of innovation leads to bad quality products as well as lack of market competitiveness with the international products. Poor or non-existent standards of safety in the workplace and for the consumer thus making the product unsafe.

The Ministry of National Food Security & Research is mainly responsible for policy formulation, economic coordination and planning in respect of food grain and agriculture. It also includes procurement of food grains, fertilizer, and import price stabilization of agriculture produce, international liaison, and economic studies for framing agricultural policies.

3.2 Major Challenges Facing Agriculture

The agriculture sector in Pakistan faces a number of major challenges in the coming years. Agriculture performance in Pakistan has been poor in recent years with low growth (3.1% in 2011-12 and 3.3% over the last decade). Major factors underlying this poor performance include a slow rate of technological innovations; problems with quality, quantity and timeliness of input supply; limited investment in construction and maintenance of infrastructure; marketing and trade restrictions; pest and livestock disease problems; and limited amounts of credit for agricultural production and processing and the lack of agriculture-specific loan products.

Poverty, food security and food safety remain major issues. Agriculture growth has not impacted the rural poor to the extent it has done in other countries and despite consistent increases in the production of wheat – with production in 2013 exceeding 24 million tons - some 30% of the population is undernourished with child wasting and stunting being a major concern for the country's future. High chemical use, poor post-harvest handling, processing and overuse of pesticides has resulted in poor quality, and sometimes unsafe, food reaching consumers. Quality of food is most often compromised when it is produced in peri-urban areas with sewage/industrial waste water and in tunnels with heavy use of fertilizer and pesticides.

Pakistan also needs to continue to build the resilience of the agriculture sector. Climate change projections indicate increased water from higher rainfall, and from runoff from glaciers and snow melt. However, this will be accompanied by greater variability in weather



with more frequent extreme events such as flood and drought. Much of the impact of these changes will be on the agriculture sector, which needs mechanisms to cope and adapt. The worse hit areas from the climate change phenomenon would be the deserts and dry regions of FATA, Khyber Pakhtunkhwa, Punjab, Sindh and Balochistan provinces; the flat and poorly drained flood-prone areas of lower Punjab and Sindh; and the coastal areas where over-exploitation of underground and intrusion of sea water are creating salinity problems for aquifers along irrigated coastal . Launching of special national flagship programs in these areas would be a major priority in this policy for improving economic wellbeing and development of these regions.

3.2.1 Key Constraints to Production and Productivity

a) Lack of a Favorable Innovation Environment:

Yield growth for most crops and livestock products in Pakistan has stagnated and become more variable in recent years, and there continues to be large gaps between achievable and realized productivity in most crops. Diversification and a move to higher value added had been limited, particularly in the crops sector, with the cultivated area under high-value crops more or less unchanged between 1960 and 2000. In part this is a result of over-focus by researchers, and other support systems, on traditional crops and cropping systems to the detriment of high value agriculture. Paradoxically, performance has been better in the livestock sector, where public support particularly for innovation and technology generation has been limited. Poultry, dairy and more recently meat, have generally done well; however, major problems remain due to poor husbandry practices particularly among smaller farmers and transhumant. Currently, the public support system for livestock is centered around health services with very limited focus on alternate feeding regimes, fodder preservation and genetic improvements. Coverage is also limited for high risk, epidemic diseases such as Foot and Mouth Disease, while problems related to effluent and disease management are major risks to the intensive poultry and dairy systems. There is wide consensus that technology and innovation can play a large role in accelerating and deepening agriculture growth and rural development. However, in order to do so there is a need to:

- Create an enabling environment where a wide range of stakeholders, including private sector, NGOs / CSOs, farmers' organization, universities and federal and provincial research institutions can work together to bring about social and economic changes; and
- Substantially increase the amount of resources allocated to agricultural research, which as a proportion of agriculture GDP, is 30 percent lower than in Bangladesh, India and Sri Lanka, and 40 percent lower than the average for the Asia-Pacific region.

b) Technology Dissemination:

Problems with a limited, and an inadequately organized research system, are compounded by weak extension linkages that has not been able to transform itself according to the changing circumstances and market requirements, or to make use of new technologies. Another major problem is the lack of a competent and well-trained cadre of service providers who could facilitate technology adoption process at grass-root levels. Lack of detailed technical guidance, inputs and advice at a large scale limit the adoption of highly viable and tested technical improvements such as High Efficiency Irrigation Systems (HEIS), alternate energy, scientific orchards management, and better post-harvest handling, value chain management, processing and marketing. Availability of such vital services providers would only be possible with the up gradation of existing training infrastructure with new curriculum and skilled faculty.

On the other hand, despite having a very large extension staff, the effective linkage with farmers, particularly small farmers, is limited. As a result the extension system was remaining slow in channelizing new technologies to farmers. Also they played a limited role in providing timely feedback on problems and issues to the research system. Administrative devolution has further weakened these services, with many extension workers now involved in activities not related to technology dissemination. New paradigms for extension are emerging based on the recognition that innovation come from various sources including the private sector and farmers themselves, and that farmers are not passive receivers of technology but are dynamic and active innovators and learners. These new approaches, which include using Information Communication Technology (ICT), Community Service Centers (CSC), the Farmer Field Schools (FFS) and Plant Clinics (PC), are yet to be mainstreamed.

c) Inefficient Water Management:

More than three fourth of culturable land in Pakistan is irrigated, with the remaining areas dependent on rainfall. Water management under both production systems is inefficient that causes low water productivity and economic prosperity. Water harvesting and efficient use in dry rainfed regions although a promising proposition but had not been adequately emphasized. Resultantly, economic disparities among irrigated and non-irrigated regions widened that had created conflicts and security problems. With improvement in water management, many rain fed areas have the potential to be converted into high value horticulture zones if a package of technologies promoted with requisite investments.

Agriculture which is largely dependent on an antiquated irrigation system characterized by large inefficiencies at canal, watercourse and field levels. In large part this is due to lack of adequate recurrent expenditures and in part due to system inefficiencies which result in farmers at the tail end of the canal system rarely getting water. Furthermore, water charges



are low, recovery rates are limited, and water revenues are collected go to the general revenue budget rather than to the provincial irrigation departments. As a result, essential repair and maintenance remained dependent on Federal subsidies and donor projects. In Punjab Abiana is charged at a flat rate Rs. 85 per cropped acre during the Kharif season and Rs. 50 per acre during the Rabi season and the gap between Operation and Maintenance (O&M) expenditure and revenue collection is 68, 80 and 77% for Punjab, Sindh and KPK, respectively. Groundwater use has been expanding rapidly in recent years but access is mainly limited to larger farmers who can make the necessary investment. In many areas lack of regulation and subsidies on electricity are leading to overexploitation. The need for major reforms in the water sector are well recognized and a number of initiatives related to changing the institutional setup, raising and rationalizing water charges, and improving water use efficiencies are underway. These reforms however have not been completely successful, due to problems at both the provincial and local levels. A renewed political commitment by Federal and Provincial Governments will help implement the changes needed to ensure a viable more efficient and sustainable irrigation system for Pakistan.

d) Access to other Inputs:

Credit can enhance productivity and also facilitate the shift to higher value cropping but access to formal credit markets in rural areas is generally limited with just over 10% percent of farmers having access to formal loans. Access is hampered by a range of problems ranging from lack of financial products that meet the risk concerns of banks and are suitable for farmers, to overreliance on land titles as collateral. Access to informal credit markets is more widespread, but rates are high and maturities too short to be a source of development finance for farmers and are largely used for consumption or for events such as marriages, funerals and illness. The supply of improved seeds for major crops has grown rapidly particularly after adoption of the national seed policy in 1994. Most seeds are provided by the private sector with a number of crops, such as maize, oilseeds and vegetable, relying heavily on imports. A key problem with seeds, which is common with a number of other inputs such as pesticides, fertilizer, seedlings, and vaccines and drugs for livestock, is one of quality. Currently there is no effective regulatory framework for private service providers, and no system to test and certify quality of the input of services they sell. The existing system to test and certify seeds is rigid and complicated.

e) Supply Chain Problems:

Supply chains link farmers to markets and over the last decade major improvements have been made, albeit in only a few areas, to improve grading, processing, storage, packaging, transport and labelling. Improvements have been particularly noticeable in fruits – part of the production of soft and stone fruit are now well graded and packed in cardboard cartons with relatively reduced losses; dairy – where major innovations have been made in the milk collection, processing and marketing systems, due in part to involvement of the private



sector and the use of contract farming; and in poultry – where strongly developed supply chains are well consolidated. Much less improvements have been made with other high value perishables, particularly vegetables and livestock – where grading and handling remains poor; and for fisheries, particularly marine fisheries where poor handling results in much of the catch being wasted or used for low values products such as animal feed. For the major cereals a key weak links are the lack of good storage facilities, particularly silos for wheat, rice and maize that result in massive losses, and, in the case of Basmati rice lack of good seed varieties.

f) Investment levels in Agriculture:

Investment levels in Pakistan's agriculture have been low. Despite the fact that over 21% of GDP comes from agriculture, less than 10% of the country's total gross capital formation goes to agriculture. Combined with problems of degradation of the resource base, particularly of water and land, and of quality and quantity of input supplies, agriculture is simply not attracting the resources needed to raise production. Investments are needed from the public sector where only a small share of federal budget and Provincial ADPs are allocated to agriculture, including irrigation. With regard to private sector investments, available evidence suggests that rural savings are not being ploughed back into agriculture or rural-based activities, but are often being moved to urban and semi-urban areas to finance trade, services and industry.

g) Pest and Disease Problems:

The system for surveillance and prevention of pest, disease and parasites prevention for crops and livestock in Pakistan is still rudimentary. Often the problems are compounded by poor practices – for example limited use of integrated pest management techniques; and limited supplies and unreliable quality of chemicals, drugs and medicines. Some of the major areas where problems exist are discussed below.

- In the crops sector, for major cereals, the most critical problem relates to poor post-harvest practices that result in large crop and financial losses for the farmer; while in high value crops, particularly horticulture and cotton, the major problem is the overuse of pesticides and other chemicals to prevent losses from pests and diseases.
- Preventable endemic animal diseases such as PPR, foot and mouth and Newcastle significantly reduce productivity of small and large ruminants and of poultry, particularly for small farmers and livestock breeders, including the nomads and transhumant who produce large number of sheep and goats; outbreaks can often wipe out years of saving of farmers or leave them in substantial debt.
- In commercial poultry, viral diseases have developed and spread rapidly in the past and such risks continue due to poor hygienic conditions and overcrowding. A high risk of such outbreaks also exist in the commercial dairy sector where large numbers of



animals live in cramped and unsanitary conditions in the dairy colonies near major towns and cities.

h) The quality of Agricultural growth:

Since 2000 Pakistan has made a major progress in reducing urban poverty from about 35% to 17%. However, the reduction in rural poverty has been much slower than the reduction in urban poverty levels. Moreover, in rural areas poverty is now concentrated among the small farmers, rural landless and those working in non-agriculture related activities. Agricultural growth can have a quick and direct impact on poverty and employment of those directly involved in agriculture, as well as on the landless and the underemployed in the non-farm economy. However, its potential in this respect has not been fully exploited. As mentioned above, overall performance had been poor; more critically, the increases that have been achieved have been through greater input and resource use, with limited success in raising productivity. An approach that targets small farmers, through improved availability of appropriate technology, better access to critical inputs, particularly quality seed, irrigation and credit, and attractive prices can raise overall growth rates while also reducing poverty.

i) Climate Smart Agriculture:

Pakistan needs to adapt to the new, more variable weather patterns that are emerging. This will require a series of actions ranging from adjustments in infrastructure; improve water harvesting infrastructure; better flood management protocols and procedures; and cropping and farming systems that can adapt to different weather conditions.¹¹

¹¹ *Agriculture and food security policy draft. Ministry of national food security and research.*

4. FRESH PRODUCE INDUSTRY (FRUITS AND VEGETABLES)

During the last decade, horticultural crop production has increased from 11.3 million tonnes to 13.7 million tonnes. The production analysis shows that share of fruits and vegetable is 48.6% and 51.4% respectively. Among the major fruit crops, citrus, mango, dates, guava and apple contribute 30, 25, 9, 9, and 5%, respectively in production. While in vegetable production potato, onion, and tomato share 29, 25 and 6 % respectively. The production mapping shows that huge potential in citrus processing, storage and exports exists in Sargodha. However, Toba Tek Singh and Mandi Bahauddin (Punjab) are also potential areas for establishing new grading, packaging and cold storage facilities. Mango is predominantly grown in Punjab, with Multan, Rahim Yar Khan and Muzaffar Garh districts sharing 54.9% of total production. However, the importance of Hyderabad and Mir Pur Khas remains obvious for domestic and export markets, due to one-month advance season Khairpur (Sindh), Turbat and Punjgur (Balochistan) and D.I. Khan (NWFP) produce dates of remarkable quality. Grapes are mostly cultivated in Balochistan (Pishin 68%, Quetta 9%). Major apple producing districts include South Waziristan (16.9%) and Swat (13.9%) in NWFP and Zhob and Mustang in Balochistan together share 22.5%. In apricot, Killa Saifullah and Loralai (Balochistan) are main areas with 50 and 13.82% production respectively. About 57% of Peaches are produced in Swat (NWFP), while premium quality plums are produced in Kalat (Balochistan), Mardan and Swat (NWFP). Among vegetables, onion is the leading vegetable crop; Chagi (Balochistan), Hyderabad and Sanghar (Sindh) are the leading production districts. Potato is mainly grown in Okara and Sahiwal in Punjab (> 43%). Top tomato producing areas include Kila Saifullah, Barkhan, Nasirabad and Jaffarabad districts in Balochistan and Swat district in NWFP. Establishment of modern packing grading and storage facilities in the production areas will not only help boost export of fresh produce, but also will help in the rural development and well-being of millions associated with this sector. Pakistan has 162.4 million people, with 17.6% in 10 main cities. Over the last decade, population increased by 2.62% annually (2.62 million per annum). Increased urbanization has resulted in increased volumes of fresh produce transported to main consumption /trade centers. Most of fruits and vegetables are produced in distant areas across the country, and the current state of transport (open non-refrigerated trucks) is one of the major factors contributing to the heavy postharvest losses (20-40%). The challenge of providing enough fruits and vegetables to the growing population @2.0% per annum, fast urbanization, and increasing exports can only be met by reducing post-harvest losses. The improvement in postharvest handling and establishment of cold chain, especially the availability of refrigerated containers will help reduce postharvest losses, improve shelf life while maintaining produce quality at destination. Although Pakistan produces large quantities of fruits and vegetables, however its exports are negligible, with large price gap compared to international average prices. Total export of fruits and vegetables during 2005-06 was only 0.557 million tonnes (4%)



worth \$168 million, @ \$301.6/t, which is almost 41% less than the average price of same commodities in international markets. Among the main reasons of lower prices include poor produce quality, export to low-end market, and limited market access on account of compliance issues (wood packing, fruit fly, pesticide residues and contaminants etc.) by many of the importing countries. The absence of modern packing, grading and refrigerated transport facilities is primary obstacle to improve quality and compliance to standards and food safety needed to enter into more lucrative but competitive markets like EU, Japan and China. Establishment of such facilities will greatly enhance competitiveness of our product, thereby increasing export. Pakistan, itself is a large market for quality fruits and vegetables. However, the marketing system lacks proper cold storage facilities and integrated cold chain, thereby has substantial postharvest losses with reduced shelf life and quality of fresh produce. The domestic price analysis shows large fluctuation in prices of most of the commodities; with minimum at peak supply periods and maximum at short supply time. Establishing cold storage facilities and storing fresh produce at peak time, while releasing at lean time will ensure availability of produce over extended period thus stabilize prices along with improving shelf life and quality. Regarding the overall cold chain infrastructure, recent studies show that total cold storage capacity of country is around 6.37%, of which >95% is in Punjab, mostly concentrated in main cities and potato growing areas. There is little concept of crop specific humidity and temperature regulation in storage thus the produce suffers both qualitatively and quantitatively due to water loss or chilling injury, etc. None of the airport, seaport or terminal (Exit/Entry) land routes has cold storage facility. As a national strategy, Pakistan needs to increase the cold storage capacity, well distributed in production areas and linked to domestic markets as well as to export points.

Further, helping private sector in technology up gradation of the existing cold storage and providing training in maintenance of cold stores will help improve the quality of produce in existing storage as well. It can be concluded that Pakistan produces abundant quantities of premium quality fruits and vegetables. Provided the high postharvest losses are minimized, country would have large production surplus with better shelf life and quality of fresh produce for export. From the aspects of sustainability, profitability and competitiveness, Pakistan needs to modernize its horticulture sector and investing in postharvest management and cold chain infrastructure is among the foremost steps to go forward.¹²

4.1 Mango Industry in Pakistan

Mango being an expensive commodity attracts farmers and associated business. Over the past few years, Far Eastern countries have increased their mango production and exports by

¹² *Establishment of Cold Chain System under National Trade Corridor Improvement Project Pre-Feasibility Report Volume-I Horticulture Industry, Pakistan Horticulture Development & Export Board.*



adhering to international standards and best practices. As a result, Pakistan has lost its position from 4th largest mango producer and is currently 7th largest producer.

The main mango growing districts in the Punjab province are Multan, Bahawalpur, Muzaffargarh and Rahim yar Khan. In the province of Sindh it is mainly grown in Mirpur Khas, Hyderabad and Thatta in the province of NWFP Mango is grown in D.I Khan, Peshawar and Mardan. Subsequently, a new trend of growing late varieties in Punjab has received a wide popularity, which has extended the market period and added to the exportable surplus. In Pakistan, 250 varieties of mango are found while most important commercial cultivars of Pakistan are:

Table: Major Mango Varieties Cultivated In Pakistan

| Alamas | Gulab Khas | Saroli |
|--------------|-------------|------------|
| Alphonso | Fajri | Sensation |
| Anwar Retaul | Langra | Swarnarika |
| Baganapalli | Malda | Totapari |
| Chaunsa | Neelum | Yakta |
| Chaunsa late | Retaul late | Zafran |
| Dosehri | Sindhri | Zardalu |

4.1.1 Mango Export Requirements

It is pertinent to note that Pakistani exports can get a gigantic leap if locally produced mango meets certain international export conditions. Fruits from orchards with a history of stem end rot or certain other diseases cannot be exported. Carbendazim and prochloraz are not acceptable for exports unless the fruit is treated with a combination of hot water and vapor heat. The following processes are compulsory export requirement for export:¹³

Table: Quarantine Requirements per Importing Country

| Importing Countries | Quarantine Requirements |
|---------------------|------------------------------|
| EU, Malaysia | Hot Water Treatment |
| Japan | Vapor Heat Treatment |
| USA | Irradiation |
| China | Extended Hot Water Treatment |

¹³Food Processing Sector in Pakistan. Switzerland Global Enterprise. <http://www.s-ge.com>

4.1.2 Potential Investment Projects In Mango Sector of Pakistan

Currently approximately only 3% of mangoes are processed into value added products such as pulp for use in drinks and ice cream, canned mangoes and dried mangoes. Potential investment opportunities in mango sector are described in the sections that follow.

i. Mango Pulping Facility

Mango pulps are important value added products having demand in both local and export markets. The local market of fruit juices, nectars and drinks has been growing at a very high rate during the past five years. Consequently, the demand for fruit pulps has also increased during this period.

Being a profitable proposition and increasing demand for pulp by local fruit juice and nectar industry, a number of players are present in the sector. The leading pulp manufacturers are listed below:

Table: Leading Pulp Manufacturers in Pakistan

| Name | Location | Capacity |
|---------------------------------------|--------------|------------|
| Indus | Lahore | 5 tons/hr |
| Tops, Muree Brewery Co. | Rawalpindi | 1 tons/hr |
| Standard Fruits | Lahore | 3 tons/hr |
| Shezan International | Lahore | 5 tons/hr |
| Popular Foods | Tando Adam | 5 tons/hr |
| Shakarganj Fruits | Chiniot | 3 tons/hr |
| Iftikhar & Co. | Karachi | 10 tons/hr |
| Mitchells Fruit Farms | Renala Khurd | 5 tons/hr |
| Agro Food Processing (AFP) (SMEDA) | Multan | 10 tons/hr |
| Citro Pak | Sargodha | 10 tons/hr |
| Anwar & Co. | Faisalabad | 5 tons/hr |

ii. Dried Mango Products

Dried mango is an important value added product; made by dehydrating mango slices or mango pulp. Dried mango products are popular in the world. There are different types of products available in this category. Cutting mango slices makes dried mango and drying those in solar and/or fuel fired dehydrators. Another variation of the product is called mango leather, which is made by making mango pulp and drying the pulp. There is demand for dried mango products in international markets. The entire major mango producing countries produce and export dried mango products. There is demand of this product in local market also; which is shown by its sale in large retail stores in the major cities of the country. Test marketing of dried mango products was also carried out by a small facility in Tando Allahyar Sindh; and the results were very positive.

There is a demand for dried mango slices and also for mango leather. Mango leather can be made in different flavors by mixing different types of spices and other additives in the mango pulp. Almost all types of value added products of mango are made in Pakistan; including pulp, juice, drink, chutney, pickle, murabbas, etc. However, dried mango products are not made in Pakistan. There is only one research scale facility in Sindh which is engaged in making this product. The facility is situated in Nawazabad Farm in Tando Allahyar, Sindh. Absence of any commercial facility for making dried mango products presents an attractive opportunity to Swiss businesses for earning good profits.

iii. Fresh Mango Grading and Packing Facility

Unlike citrus, grading and packing facilities do not exist for mango in the mango growing areas. There are very few mechanized grading and packing facilities and most of those are located in Karachi. There is a potential for investment in mango grading and packing facilities in mango growing areas of Sindh.

iv. Mango Chutney & Pickles

Another value added project is making products like mango Chutney, Pickles and Murabbas. Mango pickles of Shikarpur are already famous in Pakistan for their taste and quality, even when Shikarpur is not a major mango area. The other important product is mango chutney; which has an export market also; along with the local. Mango chutney is an important value added product of India which is sold in export markets.

v. Bottled Mango Juice

Mango juice is a popular product in Pakistan. For the past many decades, mango juice is being consumed by the Pakistanis in bottles. Therefore, this project is an attractive investment opportunity.

vi. Mango Hot Water Treatment

Sanitary and phytosanitary requirements of the importing countries are becoming stringent



with the passage of time for export of mangoes. To meet those requirements, it is important to have hot water treatment facilities for mango; for taking care of the issue of fruit fly. There are some existing facilities in Karachi; however, there is need for establishing more facilities in mango areas of Punjab.

vii. Mango Vapor Heat Treatment

Sanitary and phytosanitary requirements of mango importing countries differ. There are some countries like Japan, which require vapor heat treatment instead of hot water treatment to ward off dangers of fruit fly. Therefore, this is also potential investment project.

viii. Irradiation

One important means for meeting the sanitary and phytosanitary requirements for exporting mangoes is irradiation. This is especially important in the context of exporting mangoes to the largest export market of USA. One such facility (PARAS Foods) has become operational in Lahore. There is need for establishing a larger facility in Karachi and Multan for mango, which will be used for other horticulture/food products.

4.1.3 Market Access Requirements for Fruits & Vegetables by developed countries:

a) Europe

Europe is very demanding about food safety, which is why dealing with fresh agricultural products is subject to various legal and other buyer requirements. But there are also opportunities to distinguish yourself by applying additional or niche market quality standards. This document provides an overview of the most common requirements and standards, as well as the specific requirements that apply to niche markets such as organic or fair trade fruit and vegetables. When exporting fresh fruit and vegetables to Europe you have to comply with the following requirements.

i) Limited Use of Pesticides

The European Union (EU) has set maximum residue levels (MRLs) for pesticides in and on food products. Strict compliance with MRLs and the prevention of microbial contamination are preconditions for entering the European market. Products containing illegal pesticides or higher amounts than allowed will be withdrawn from the EU market. Note that buyers in several Member States use MRLs, which are stricter than the MRLs laid down in EU legislation. Most supermarkets have their own standards (codes of practices) regarding pesticides, which are stricter than legislation. Your buyer will then also impose them on your products.



ii) Control of Food Imported to the EU

To ensure food safety and avoid environmental damage, the EU has restricted the use of certain chemicals (MRLs) in several Regulations and Directives. Therefore, your products will be subjected to official controls. These controls are carried out to ensure that all foods marketed in the EU market are safe, i.e. in compliance with all applicable regulatory requirements. There are three types of checks:

- Documentary checks
- Identity checks
- Physical checks

In the event of repeated non-compliance of specific products originating from particular countries, the EU can decide to carry out controls at an increased level or to lay down emergency measures. Controls can be carried out at all stages of import and marketing in the EU. However, most checks are done at the points of entry in the EU.

For importers of fresh fruit and vegetables, the traceability of products is compulsory. To fulfil this obligation, importers in the EU will require you to provide proof of the origin of all fruits and vegetables with a Bill of Lading, phytosanitary certificate, packing list and custom documentation.

iii) Marketing Standards

EU legislation sets general and specific marketing standards for the minimum quality and the minimum maturity of all fresh fruit and vegetables. There are specific marketing standards (MS) for the following fresh fruit and vegetables: apples, citrus fruit, kiwi fruit, lettuce, peaches and nectarines, pears, strawberries, sweet peppers, table grapes and tomatoes. These products must be accompanied with a certificate of conformity with each consignment. Fresh products that are not covered by a specific marketing standard have to comply with the general marketing standards (GMS) or the applicable UNECE standard (sometimes less strict than the EU standard). Operators are free to choose which to use. Imports of products intended for processing are not subject to compliance with the EU marketing standards. However, these must be clearly marked by the pack with the words "intended for processing" or other equivalent wording.

iv) Labelling and Packaging

Food placed on the EU market must meet the legislation on food labelling. Cartons of fresh fruit or vegetables must mention the following particulars:

- The name and the address of the packer and the dispatchers
- The name of the produce (if the produce is not visible from the outside of the packaging)



- The country of origin
- The class and size (referring to the marketing standards)
- Lot number for traceability
- Note that there is also non product specific legislation on packaging and liability that apply to all goods marketed in the EU.

v) Plant Health

Fruit and vegetables exported to the EU, must comply with the EU legislation on plant health. The EU has laid down phytosanitary requirements to prevent introduction and spread of organisms harmful to plants and plant products in the EU. The requirements mainly imply that:

- Certain listed organisms are not allowed to be imported into the EU, unless specific circumstances apply.
- Plants or plant products specified in Part B, Annex V of Directive 2000/29/EC must be accompanied by a plant health certificate.

vi) Contaminants

Contaminants are substances that have not been intentionally added to food, but may be present as a result of the various stages of its production, packaging, transport or holding. To avoid negative impact on the quality of food and risks to human health, the EU has set limits for several contaminants. Especially the limits for nitrate (in spinach and lettuce) and metals (cadmium, lead, mercury and inorganic tin) are relevant for fresh fruit and vegetables.

vii) Certification as Guarantee

As food safety is a top priority in all EU food sectors, you can expect most buyers to request extra guarantees from you in the form of a certification. Many EU buyers (for example traders, food processors, retailers) require the implementation of a food safety management system based on Hazard Analysis and Critical Control Point (HACCP). The most commonly requested food safety certification scheme, essential for exporting fresh produce to Europe, is GLOBAL G.A.P. This is a pre-farm-gate standard that covers the whole agricultural production process, from before the plant is in the ground to the non-processed product (processing not covered). GLOBALG.A.P. has become a minimum standard for most European supermarkets.

In addition to GLOBAL G.A.P., other food safety management systems can be required as well. Almost all buyers on the North-Western European market will require you to comply with the British Retail Consortium (BRC) global standards, which are widely applied as a standard for hygiene and safety. On the European mainland, buyers sometimes require you



to comply with the IFS food standard, Safe Quality Food (SQF) program, FSSC22000 or other industry-developed standards. All the mentioned management systems are recognized by the Global Food Safety Initiative (GFSI), which means that they should all be accepted by the major retailers. Compliance with certification schemes varies between countries, trade channels and market situations. Buyers can be more lenient during supply shortages.

viii) Quality Specifications

Quality is integrated in food safety requirements and marketing standards. At the same time, buyers use their own specific quality specifications. The importance of quality is not to be underestimated. There are many claims from buyers on quality of fresh fruit and vegetables because they are perishable products. In this fast moving and perishable market 'sudden' decisions are taken, such as 'dumping' your products at very low prices when quality starts to deteriorate.

The standards that are most widely used by EU importers and traders are those developed by the United Nations Economic Commission for Europe (UNECE) and the Codex Alimentarius Commission (CAC). It should be noted that these standards remain subject to legally required marketing standards.¹⁴

b) USA

On July 10, 2007 a Frame Work Equivalency Plan was signed between two NPPOs viz, Department of Plant Protection/MINFAL and Plant Protection and Quarantine USDA for trade of irradiated commodities between Pakistan and USA. The FEWP was signed between two departments under USDA code of Federal regulations (CFR), 7 CFR parts 305 and 319, to import irradiated commodities in to United States.

Both departments agreed in principle to allow the use of irradiation as phytosanitary treatment for commodities imported from the United States. Pakistan Department of Plant Protection further agrees to accept a generic dose of 150 Gy to treat fruit for fruit flies and a generic dose of 400 Gy to treat for all insect pests excluding adults and pupae of the order Lepidoptera. Under the Plan the fruit are first inspected for presence of live pests or any spoilage by APHIS/DPPO Preclearance officer at the irradiation facility in Pakistan. If there are no pests present, the fruit will be authorized to be treated with the specified doses of irradiation prior to export at the APHIS recognized irradiation facility.

In case any spoilage/live pests are found during the preclearance inspection, the shipment will not be eligible for export to USA. Mangoes must be packed in insect-proof boxes and safeguarded after irradiation treatment to prevent any reinfestation. Consignment also

¹⁴ *Buyer Requirements - Fresh Fruit and Vegetables in Europe (2016)*. <https://www.cbi.eu/market-information/fresh-fruit-vegetables/buyer-requirements/>

must be accompanied by phytosanitary certificate issued by Department of Plant Protection Organization of Pakistan with additional declaration certifying that the treatment and inspection of mangoes were made in accordance with regulations.¹⁵

c) MIDDLE EAST

While the UAE has accepted English-only labels in the past, bi-lingual labels are now required.

Arabic stickers and labels should be legible and show, at least, the following information:

1. Product description
2. Ingredients
3. Country of origin
4. Net weight

All imported food products must be accompanied by:

- A health certificate issued by the appropriate government agency in the exporter's country attesting to the product's fitness for human consumption
- Bill of Entry or Airway Bill
- Packing list
- Country of Origin Certificate.

There are no special packaging or container size requirements for food products. The UAE does not allow the importation of irradiated food products. A radiation-free certificate is required for food products from Europe and Asia.

There are no specific requirements for imported food samples. Samples for food shows and other promotional events are routinely exempt from local labeling and shelf life requirements. Product samples must be clearly marked as samples and accompanied by a statement claiming that they are not for sale.

Every food shipment is subject to visual inspection upon arrival to ensure compliance with label and shelf life regulations. A product will be rejected if found unfit for human consumption or non-compliant with label requirements.¹⁶

¹⁵ <http://www.phdec.org.pk/paras/paras.php>. Pakistan Horticulture Development and Export Company. Ministry of Commerce, Gov. of Pakistan.

¹⁶ *All you should know before exporting to UAE.*
http://agritrade.iift.ac.in/html/Training/Market%20study/UAE_Final_Report.pdf

5. JUICE AND BEVERAGE INDUSTRY

The beverage industry in Pakistan has emerged as a progressive sector over the years. The beverage industry of Pakistan is divided into two broad categories such as production of Juices, Squashes and Syrups and the other kind producing aerated beverages. A comprehensive categorization of the beverage industry would include divisions like; aerated drinks, juices, milk based drinks, energy and sports drinks, tea, and coffee and also, bottled and bulk water as well. Pakistan is one of the few countries of the world, where a variety of fruits are grown in cool temperate climate such as apples, pears, plums, cherries, and those grown in the warm temperate climate are apricots, figs, grapes, pomegranates, melons and the rest in the tropical and sub-tropical climate like bananas, mangoes, dates, guava and citrus fruits, which are available throughout the year. While the fruits grown in temperate climate are produced in Baluchistan and NWFP, tropical and subtropical fruits are mostly grown in Punjab and Sindh.

Fruit juices acts as a nutritious beverage and can play a significant part in a healthy diet because they offer a variety of nutrients found naturally in fruits. Being one of the best forms of nature's power foods, they are really valuable in the search for health. Scientific studies have also claimed that the antioxidants found in most fruits and vegetable juices can help lower a person's risks of developing Alzheimer's disease. Antioxidants are naturally occurring substances found in most plants and have the potential to help combat heart diseases and fight cancer.

About 170 units are operating across the country in this particular sector at present. 38 units are producing fruit juices, syrups and squashes. Nestlé Pakistan Ltd, Mitchells Fruits and Benz Industries are the major fruit juices, syrups and squashes units of the country. Most of the existing fruit juice units are being operated in Lahore, Bahawalpur, Karachi, Hyderabad, Hattar (NWFP), Loralai, and Sargodha. Around 92% of the total fruit juice market is accounted for 250 ml Tetrapack.

The rising cost of raw material and packing materials etc. have resulted in the price increase of fruit juice products in the local market.

5.1 Export of Fruit Juices

Pakistan exports considerable quantities of fruit juices, mainly to Afghanistan, India and Middle East countries.

Country wise details of exports are given in Table below:



Table: Export of Juices from Pakistan.**Value: \$ 000**

| Importers | Exported value in 2015 | Exported value in 2016 | Exported value in 2017 | Exported value in 2018 | Exported value in 2019 |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| World | 30,289 | 21,786 | 26,087 | 23,279 | 20,706 |
| Netherlands | 4,891 | 6,682 | 6,152 | 4,270 | 3,323 |
| United States of America | 1,146 | 1,601 | 2,330 | 2,506 | 2,839 |
| United Kingdom | 2,001 | 1,817 | 2,033 | 2,196 | 2,215 |
| Afghanistan | 2,777 | 2,009 | 4,023 | 774 | 2,067 |
| United Arab Emirates | 1,124 | 1,028 | 997 | 504 | 1,636 |
| Canada | 708 | 731 | 998 | 1,444 | 1,409 |
| Thailand | 727 | 817 | 907 | 809 | 853 |
| Oman | 23 | 479 | 1,629 | 1,473 | 806 |
| Somalia | 242 | 275 | 526 | 515 | 589 |
| Qatar | 0 | 0 | 41 | 232 | 548 |
| Sri Lanka | 316 | 586 | 334 | 341 | 498 |
| Spain | 75 | 112 | 261 | 2,791 | 466 |
| China | 55 | 114 | 311 | 299 | 398 |
| Turkey | 0 | 0 | 34 | 0 | 389 |
| Australia | 225 | 237 | 340 | 717 | 383 |
| Germany | 184 | 199 | 257 | 187 | 299 |
| South Africa | 979 | 92 | 208 | 91 | 199 |
| Mauritius | 214 | 171 | 209 | 102 | 191 |
| Bangladesh | 140 | 186 | 216 | 150 | 170 |
| Botswana | 151 | 229 | 184 | 176 | 137 |
| Hong Kong, China | 118 | 133 | 139 | 95 | 111 |
| Denmark | 14 | 27 | 0 | 67 | 106 |
| India | 1,138 | 1,954 | 1,600 | 1,039 | 98 |
| Mozambique | 156 | 94 | 54 | 187 | 83 |
| Poland | 0 | 0 | 9 | 6 | 74 |
| Libya, State of | 3 | 229 | 234 | 148 | 72 |
| Bahamas | 0 | 26 | 53 | 44 | 68 |
| Greece | 31 | 38 | 19 | 35 | 68 |



| | | | | | |
|---------------------|-------|-----|-----|-------|----|
| Sweden | 78 | 107 | 97 | 93 | 67 |
| Maldives | 13 | 5 | 12 | 38 | 63 |
| Angola | 7,184 | 456 | 901 | 1,126 | 55 |
| Portugal | 181 | 45 | 0 | 0 | 41 |
| Norway | 14 | 25 | 28 | 25 | 40 |
| Jamaica | 0 | 0 | 0 | 0 | 35 |
| Malaysia | 154 | 59 | 0 | 90 | 33 |
| Kyrgyzstan | 22 | 0 | 0 | 23 | 29 |
| Belgium | 50 | 86 | 86 | 42 | 25 |
| New Zealand | 26 | 27 | 0 | 9 | 24 |
| Tajikistan | 0 | 0 | 0 | 31 | 21 |
| Japan | 145 | 264 | 33 | 11 | 20 |
| Senegal | 0 | 0 | 21 | 0 | 19 |
| Cameroon | 10 | 76 | 30 | 10 | 16 |
| Djibouti | 25 | 98 | 8 | 10 | 16 |
| Viet Nam | 0 | 4 | 29 | 0 | 15 |
| Trinidad and Tobago | 0 | 0 | 0 | 0 | 14 |
| Ghana | 34 | 23 | 0 | 0 | 12 |
| Bahrain | 1 | 0 | 2 | 0 | 11 |
| Ireland | 27 | 15 | 25 | 21 | 10 |
| Italy | 78 | 258 | 262 | 241 | 9 |
| Singapore | 187 | 23 | 8 | 15 | 7 |
| Kenya | 0 | 14 | 0 | 12 | 5 |
| Saudi Arabia | 289 | 266 | 204 | 14 | 3 |
| Chile | 0 | 5 | 0 | 0 | 2 |
| Philippines | 0 | 0 | 0 | 0 | 1 |
| Congo | 0 | 12 | 0 | 0 | 0 |
| Equatorial Guinea | 0 | 0 | 0 | 24 | 0 |
| Turkmenistan | 0 | 6 | 0 | 0 | 0 |
| Brunei Darussalam | 26 | 0 | 0 | 0 | 0 |
| Comoros | 31 | 9 | 39 | 0 | 0 |
| Cyprus | 0 | 0 | 10 | 0 | 0 |
| Benin | 24 | 4 | 0 | 10 | 0 |
| Fiji | 11 | 0 | 19 | 4 | 0 |

| | | | | | |
|--------------------|-------|----|----|-----|---|
| France | 25 | 14 | 19 | 32 | 0 |
| Gabon | 0 | 0 | 2 | 0 | 0 |
| Gambia | 23 | 0 | 0 | 0 | 0 |
| Guinea | 6 | 0 | 0 | 14 | 0 |
| Guyana | 0 | 0 | 6 | 6 | 0 |
| Iran | 2,724 | 0 | 0 | 0 | 0 |
| Iraq | 0 | 6 | 0 | 0 | 0 |
| Côte d'Ivoire | 8 | 0 | 10 | 0 | 0 |
| Jordan | 11 | 0 | 0 | 0 | 0 |
| Korea, Republic of | 37 | 6 | 66 | 138 | 0 |
| Kuwait | 11 | 0 | 26 | 0 | 0 |
| Lebanon | 33 | 0 | 1 | 0 | 0 |
| Liberia | 13 | 0 | 0 | 0 | 0 |
| Malta | 5 | 0 | 0 | 0 | 0 |
| Nigeria | 0 | 0 | 2 | 0 | 0 |
| Seychelles | 12 | 0 | 0 | 0 | 0 |
| Togo | 12 | 6 | 0 | 0 | 0 |
| Egypt | 1,035 | 0 | 0 | 0 | 0 |
| Tanzania | 0 | 0 | 1 | 20 | 0 |
| Yemen | 281 | 0 | 34 | 0 | 0 |

Source: Trade Map

Pakistan is exporting frozen orange juice to Cyprus, The Netherlands, India, Thailand, Srilanka, Bangladesh, Italy and UAE.

With price competition in the international market, Pakistani exporters find it hard to compete due to constant in rise prices of sugar and packaging material. Despite the above handicaps some major units have managed to export their products in foreign market at competitive prices. Production of major fruits is shown in below Table:

Table 5: Production of Fruits (Major Items)

(000 Tonnes)

| Fruits | 2015 | 2016 | 2017 | 2018 | 2019 |
|--------|---------|---------|---------|---------|---------|
| Citrus | 2395550 | 2344086 | 2180037 | 2351386 | 2468671 |
| Mango | 1716882 | 1636473 | 1784089 | 1735000 | 1722683 |
| Banana | 118044 | 134634 | 137449 | 140415 | 135660 |
| Apple | 616748 | 620481 | 669912 | 564693 | 543645 |



| | | | | | |
|--------------|----------------|----------------|----------------|----------------|----------------|
| Grapes | 66036 | 65854 | 66192 | 66987 | 68471 |
| Pomegranate | 42641 | 40125 | 37692 | 36840 | 37613 |
| Guava | 488017 | 522573 | 547647 | 586070 | 547546 |
| Dates | 537204 | 467756 | 438989 | 540606 | 420127 |
| Apricot | 170504 | 172933 | 165918 | 141721 | 107986 |
| Peach | 66792 | 70750 | 71639 | 72536 | 87864 |
| Pear | 17012 | 16569 | 16452 | 15926 | 15642 |
| Plum | 54304 | 54634 | 45863 | 46423 | 47701 |
| Almond | 21881 | 21451 | 21747 | 20615 | 19994 |
| Fig | 459 | 423 | 248 | 254 | 225 |
| Jaman | 6364 | 5453 | 5076 | 5036 | 4811 |
| Litchy | 1644 | 1755 | 1752 | 1844 | 2024 |
| Phalsa | 4063 | 3848 | 4029 | 3978 | 4209 |
| Walnut | 14831 | 13751 | 14273 | 14618 | 14862 |
| Ber | 24635 | 24320 | 23970 | 22167 | 22716 |
| Loquat | 8823 | 9900 | 9970 | 10306 | 10523 |
| Mulberry | 2100 | 2134 | 1952 | 1804 | 1786 |
| Strawbery | 609 | 767 | 940 | 986 | 795 |
| Chikoo | 6677 | 6782 | 6749 | 6914 | 7104 |
| Coconut | 10030 | 10040 | 9867 | 9765 | 9802 |
| Cherry | 2083 | 2140 | 2067 | 1964 | 2096 |
| Pistachio | 659 | 706 | 667 | 654 | 695 |
| Papaya | 6743 | 6185 | 6548 | 7201 | 37409 |
| Percimen | 26760 | 26879 | 26763 | 25083 | 25714 |
| Melons | 544966 | 537198 | 540379 | 551886 | 546006 |
| Others | 49899 | 46686 | 45455 | 64556 | 49197 |
| Total | 7022960 | 6867286 | 6884331 | 7048234 | 6963577 |

Source: Agriculture Marketing Information Service ¹⁷

¹⁷ <http://www.amis.pk/agristatistics/statistics.aspx>

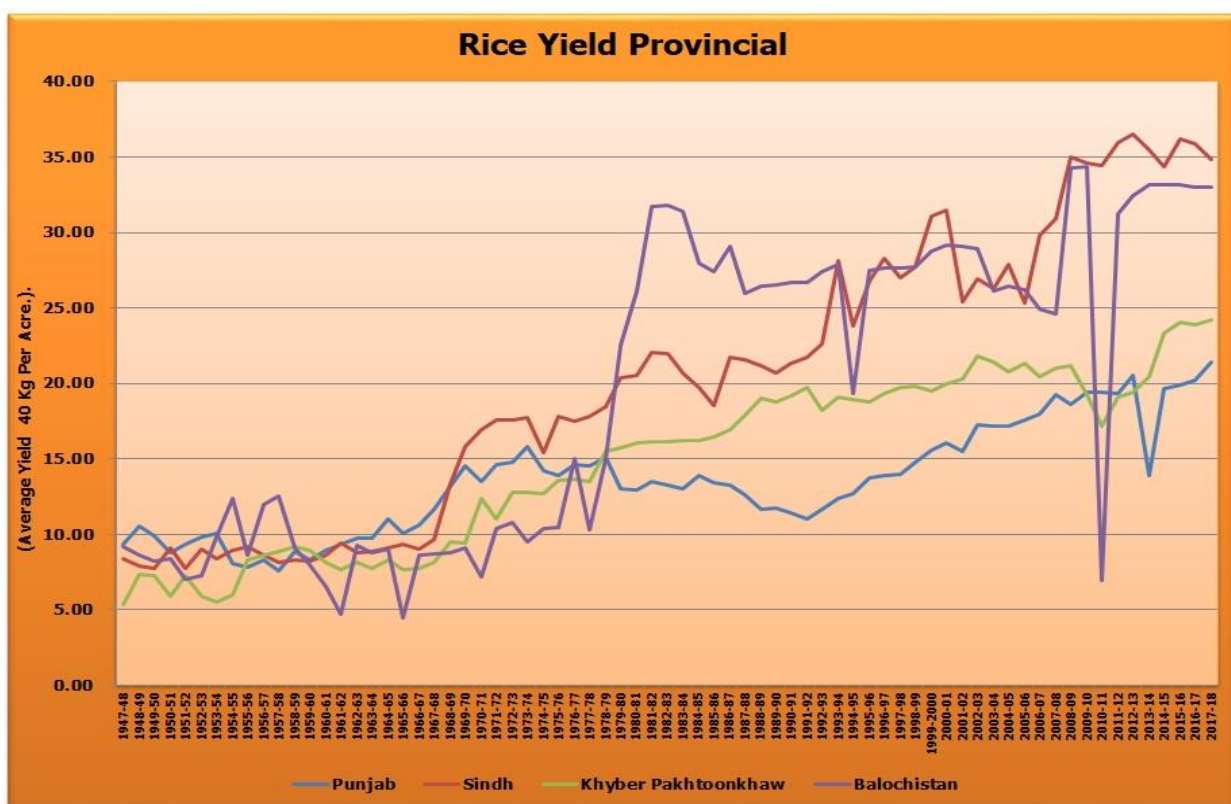


6. CEREALS PROCESSING

Major cereals cultivated in Pakistan include wheat, rice, maize, millets, sorghum (jowar), and barley. The area under these cereals averaged 12.483 million hectares (ha) per year. Wheat, rice, and maize, are the most important food grains (cereals) in Pakistan, are also the staple food crops. Together, these three crops command 94 percent of the area under cereals and make up 98 percent of the annual production of all cereals.¹⁸

Both wheat and rice, Pakistan's staple foods, are also important traded commodities. Pakistan is the 10th largest producer of rice and the 5th largest exporter of the commodity. Pakistan has been a regular wheat importer, with occasional exports during the last decade.

Figure: Rice Yield Pakistan

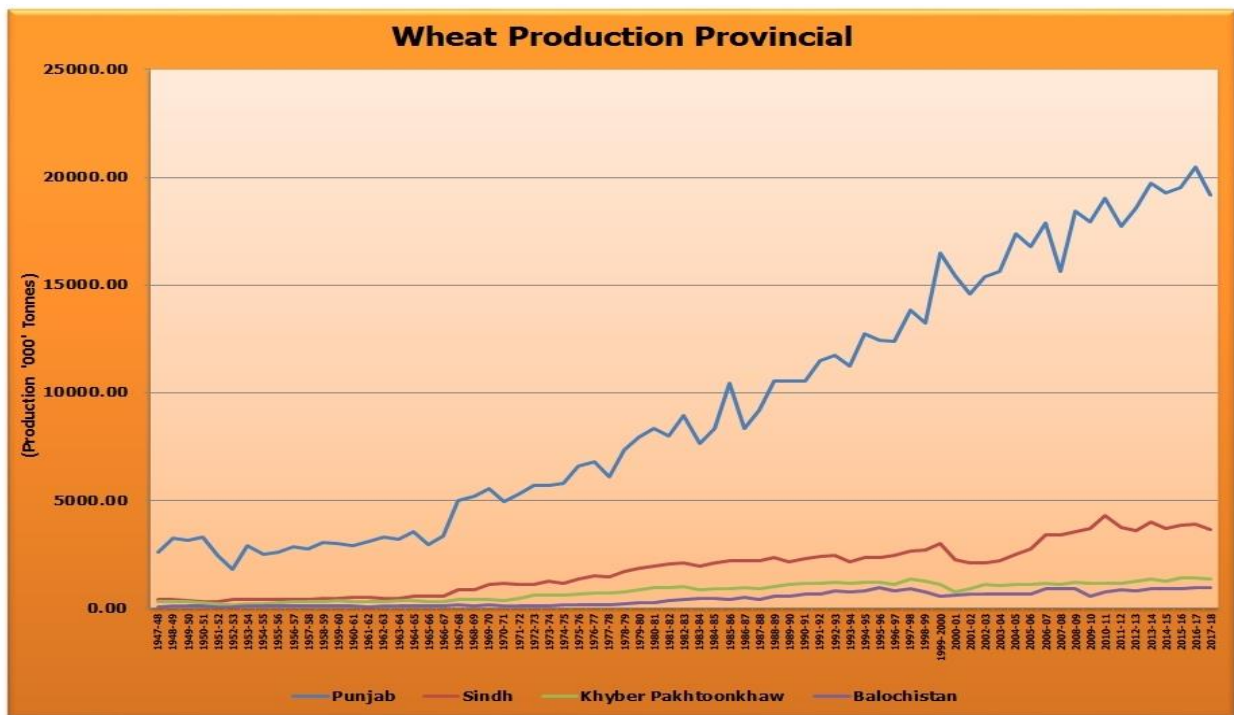


Source: Agriculture Marketing Information Service, Directorate of Agriculture, Punjab Lahore.

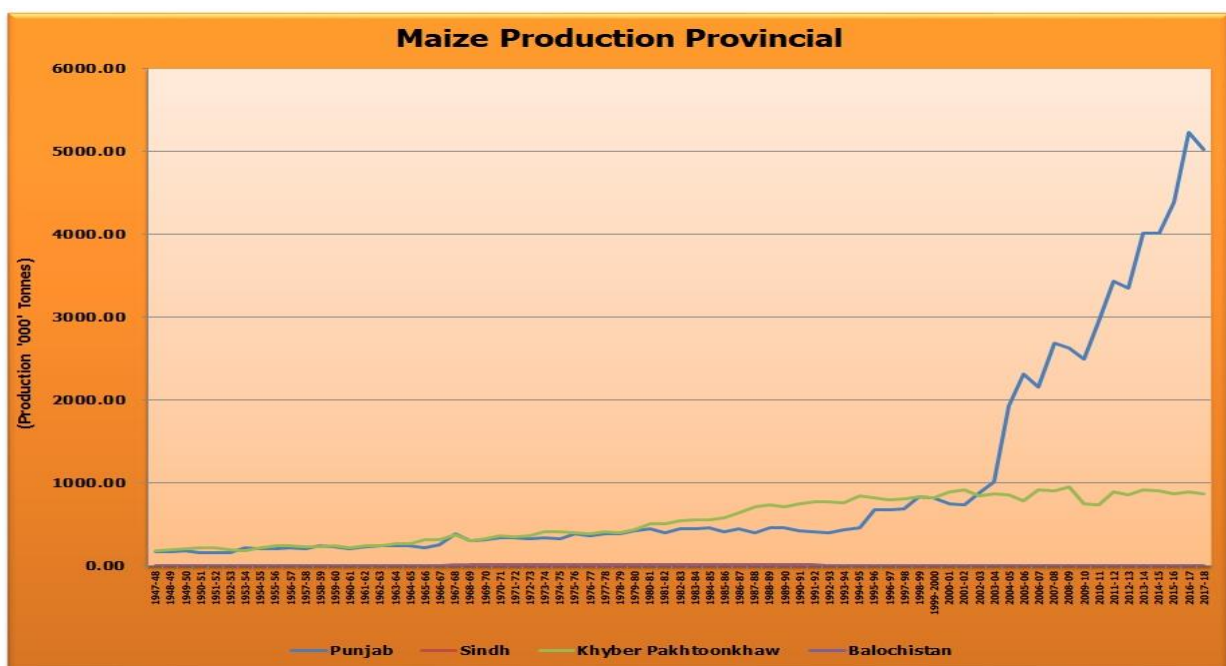
¹⁸ *Competitiveness of cereals exports from Pakistan.*

http://apply.jar.punjab.gov.pk/upload/1456204338_119_14_Paper_No._216.pdf



Figure: Wheat Production Pakistan

Source: Agriculture Marketing Information Service, Directorate of Agriculture, Punjab Lahore.

Figure: Maize Production

Source: Agriculture Marketing Information Service, Directorate of Agriculture, Punjab Lahore.

6.1 Cereal Products

Increasing westernization is fuelling awareness of Western lifestyle trends, with a growing number of Pakistani consumers adapting to Western ways and shifting from traditional methods. This also applies to eating habits of consumers, with a growing number of consumers regularly consuming Western dishes. This has led to an increase in the consumption of breakfast cereals as well. Moreover, busier lifestyles are fuelling consumption of breakfast cereals instead of more traditional breakfasts which include parathas. However, this trend has only been observed in urban areas. Associated products made from cereals are

a) Porridge

Porridge is the most healthy breakfast idea. It is rich in minerals and has high fiber content that keeps blood sugar under control.

b) Cornflakes

Abundant in carbohydrates, iron and Vitamin B complex, cornflakes work very well for school kids and elders too. It is a particularly good breakfast in the rainy months because the body starts holding water owing to high moisture in the air.

c) Wheat Flakes

It is a modification of wheat porridge and is a nice change from run-of-the-mill breakfast cereals. But unless fortified with extra calcium, it is not much use having just wheat flakes for breakfast.

d) OATMEAL

A bowl of oats in the morning is great for those suffering high cholesterol and diabetes. The high fiber content in oats balances the blood sugar, and relieves people prone to depression.

e) MUESLI

Muesli is a great breakfast choice as it has raisins, almonds and four different grains. The comparatively high sugar content in muesli keeps growing children and those into sports, energetic.

6.2 MARKET LEADERS IN CEREAL PRODUCTS

Fauji Cereals continues to lead sales, recording a value share of 72% in 2015 due to its longstanding presence in the market. Fauji offers a wide range of products in every cereals area and has an extensive distribution system which allows it to distribute its products in all areas of urban cities. Nestle is another leading manufacturing brand of cereals in Pakistan.



7. BAKERY & CONFECTIONARY

According to the official categorization, sweets, toffees, candies and gums fall in the category of confectionery while biscuits, wafers, white and brown bread and rusks are in the category of biscuits and bread. Several modern units have been established in different areas of Pakistan that produce quality. The production is not only meeting local demand but items are also being exported. The exports of sugar confectionery, chocolates and biscuits have shown a rapid growth during the last 10 years. This sector has vast opportunities to expand export especially to Europe and Middle East. Therefore, there exists tremendous scope of setting confectionery and food processing units to utilize indigenous raw materials and by exporting these products foreign exchange can be earned.

Pakistan is also importing substantial quantity of confectionery and chocolates including other food items. If production of quality products is increased and prices are lowered the import of these items may be curtailed to a reasonable level.¹⁹

The confectionery items, the non-traditional items, have great scope of export but the industry is facing numerous problems which are hampering export led growth of confectionery.

Table: International Market for some Bakery Items

| Items | World (\$) | Pakistan (\$) |
|------------------|---------------|---------------|
| Waffles & wafers | 2,327,272,945 | 265,895 |
| Sweet biscuits | 5,388,010,972 | 11,024,059 |
| Rusks | 457,350,056 | 279,009 |
| Chocolates | 3,113,452,948 | - |

Table: Bakery and Confectionery Units of Pakistan

| | |
|------------------|--------------------|
| Biscuits & Bread | 42 units |
| Capacity | 46,830 |
| Production (80%) | 37,464 Metric tons |

¹⁹ *World Food Market and Compliance Requirements - Guidelines for Food Industry. SMEDA*

| | |
|-----------------------------------|---------------------------|
| Confectionery (Registered) | 23 |
| Capacity | 54,300 Metric tons |
| Production | 33,000 Metric tons |
| Small units | 5,000 Metric tons |
| Medium sized | 12,000 Metric tons |
| Total confectionery | 50,000 Metric tons |

The formal confectionery industry in Pakistan is dominated by few large players i.e. Hilal (20%), CandyLand (15%), Mayfair (12%), JoJo (12%) and others (41%). The availability of adequate infrastructure and financial resources enables these large players to operate with a range of branded products. The type of products includes Candies, Chews, Jellies, Chocolates, Wafers, Lollypops and Snacks. While the big players comprise registered companies, small scale players are largely operating with single unit machines.

7.1 Challenges Associated to Baking and Confectionery Industry

A major challenge to the formal confectionery industry is from informal cottage operators who imitate popular products under their own brand name or fraudulently use the name of well established brands in the market. Such operators are more active in rural areas where registered companies have limited presence. However, with increasing raw material prices, bulk of such operators, which lack financial muscle, are being wiped out from the market. This has benefited the formal sector with increase in market share.

The distribution set-up of registered companies incorporates Direct Sales Force (DSF) and wholesale distributors. Normally, the presence of DSF in urban centers targets retail outlets while support from wholesale distributors in cities is sought on a limited scale. However, the role of distributors in rural and remote areas is more prominent where distribution cost would be higher if DSF is applied. A number of market players have export sales to various countries in Asia, America, Europe and Africa. The demand in confectionery industry is seasonal in nature. Generally, industry experiences lower demand in summer season largely on account of summer vacations in schools and also due to relatively lower consumption of chocolates in hot weather. Therefore, companies build-up adequate stock levels prior to winter season when demand is at its peak. The major raw material used in confectionery items is sugar. With the rise in sugar price, its proportion in the overall cost of sales has increased, though the ratio is still not significantly high. On the other hand, a number of raw material ingredients are imported having high value. These ingredients include packaging



material, gum base, fats, cocoa, taste enhancers and food colors, etc. The prices of imported raw materials have increased manifolds within a year. While it is relatively difficult to increase the price of confectionery items due to coin barriers psyche of the consumer, margins are often maintained by adjusting the size of products whenever there are changes in raw material prices.²⁰

7.2 Sugar Industry

Pakistan is the world's fifth largest producer of sugarcane and the eighth largest producer and consumer of sugar. Sugarcane is grown on approximately 1.2 million hectares and provides the raw material for 89 sugar mills. The sugar industry is the country's second largest agriculture-based industry after textiles. In addition to sugar, sugarcane is used in the production of pharmaceuticals, ethanol, bagasse for paper and chip board manufacturing, and press mud - a source of organic fertilizer for crop production. Sugarcane is typically grown on the high delta away from flood areas along Pakistan's major rivers.²¹

Sugar manufacturing comprises several procedures including cleaning, slicing, extraction, evaporation and crystallization. On arrival of sugarcane at mill yards, it is passed through water and combing drums. Following the cleaning process, a machine shreds the cane into pieces. The shredded pieces move through a series of heavy-duty rollers which extract juice from the pulp. Lime and heat are used to remove impurities from the juice. Juice is then evaporated through a vacuum resulting in a syrupy extract. About two-thirds of water is removed through this evaporation. The syrup is then boiled at lower temperatures under vacuum and processed into crystals; it is sent to a centrifuge which spins and dries the crystals into raw sugar. Sugar crystals are re-purified for removal of molasses and other minerals. Lastly, evaporation and drying process is performed following which the final product is packaged and shipped. Major by-products of sugar production are molasses and bagasse fiber. Local sugar millers process molasses into ethanol through their own distillery plants or sell it to local distilleries and exporters. Pakistan's sugar sector has the capacity to produce over 2.5m MT of molasses.²² Moreover, sugar manufacturers mainly utilize bagasse for paper and chipboard manufacturing and also as a raw material for in-house power generation.

The Punjab provinces accounts for 65 percent of sugarcane area, Sindh 25 percent, and Khyber

Pakhtunkhwa (KPK) 10 percent. There is also a small sugar beet industry in the higher elevations of Khyber Pakhtunkhwa. Farmers opt for sugarcane planting in autumn or spring;

²⁰ *Confectionery Industry, Sector Update – April 2011. JCR-VIS. <http://www.jcrvis.com.pk/kc-sect.aspx>*

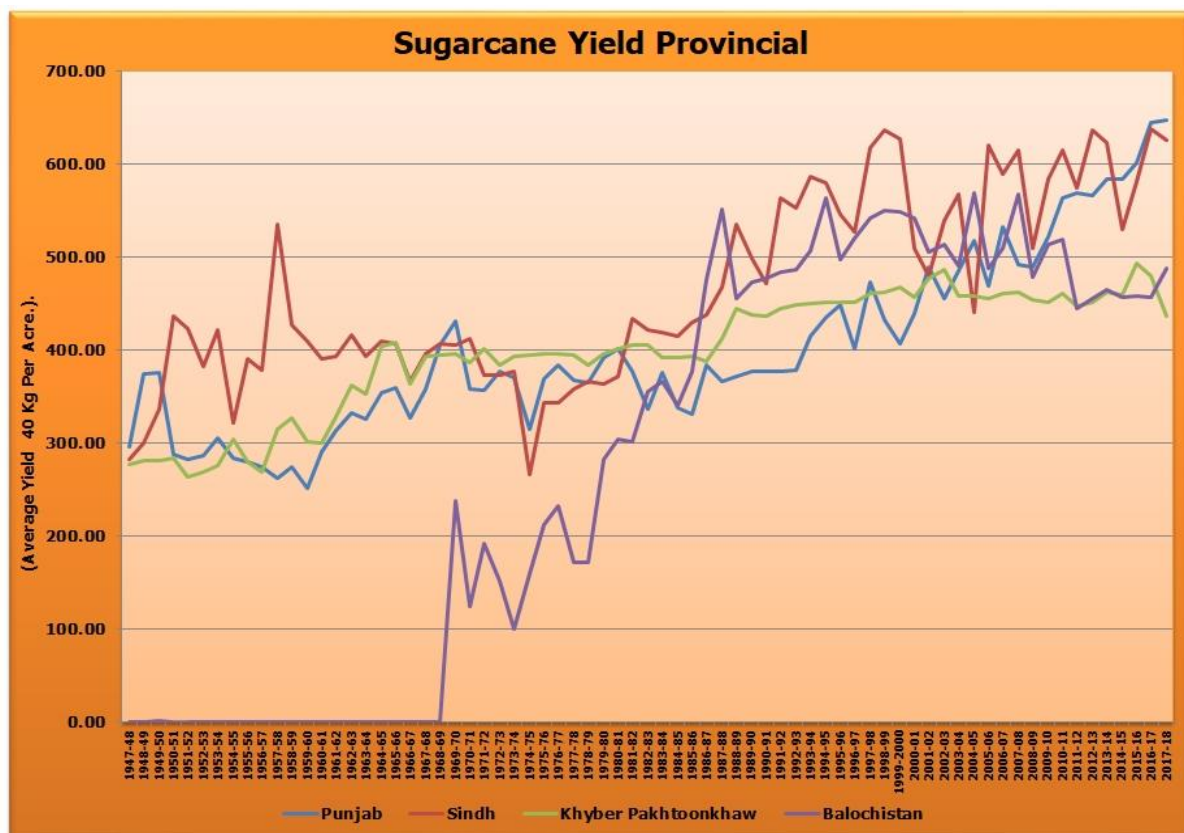
²¹ *USDA – Foreign Agriculture Service*

²² *PSMA (Pakistan Sugar Mills Association) Annual Report*



autumn planting provides better results due to a longer growing season. Punjab and KPK farmers mostly plant sugarcane in the spring and harvest eight to ten months later. In Sindh, most planting is in the autumn, allowing growth for up to 16 months. Per hectare yields of sugarcane in Pakistan are relatively low. According to experts, water shortages, a lack of high yielding varieties, and uneven fertilizer and pesticide application contribute to lower yields. Many observers agree that Pakistan would benefit from additional sugarcane research and development initiatives in line with international standards. The harvesting period follows the pattern of many other northern hemisphere crops, beginning in October/November and ending in April/ May. The table below depicts province-wise sugarcane production:

Figure: Sugarcane Production by Province



Source: Agriculture Marketing Information Service, Directorate of Agriculture, Punjab Lahore.

8. MEAT PROCESSING INDUSTRY

Meat and meat products are an important source of high quality protein, iron and vitamin in the diet of the people of Pakistan. The demand for meat and meat products is continuing to increase due to the population growth, urbanization and rising per capital income. It is a well-known fact that traditional system of meat production and marketing are no longer able to meet this growing demand of quality meat as indicated by continuous to increase in prices of meat.

8.1 Halal Meat Industry

The halal food market, at just over \$640 billion a year worldwide, is one of the largest opportunities in the food and agribusiness sector. It is also one that plays to the unique advantages of being based out of Pakistan.

According to the Economic Survey of Pakistan for fiscal year 2020, livestock contributes around 60% to the total agriculture sector, 11.7% to total Gross Domestic Product (GDP) and 3.1% to Pakistan's exports. Even though Pakistan is clearly a large meat producer, it only ranks 18th in world meat exports, and only serves 3% of the global market.

8.2 Market Dynamics

Perhaps the single biggest advantage that Pakistan has is proximity. The country is closer to the Middle East than any of its biggest rivals in the market. The three countries with the largest market shares are Australia, Brazil and India, each of which has considerably higher shipping costs to these export markets compared to Pakistan.

Brazil is particularly dominant in beef, accounting for as much as 39 per cent of the region's beef imports. It absolutely dominates the meat market in Iran, with a share of 99 per cent in 2009, yet there is virtually no difference between Brazilian meat and Pakistani meat. The Brazilian animal is exactly the same as most of Pakistan's breeds of cattle. The quality of meat is also the same the only difference is their ability to market their meat is better. Pakistan can easily displace Brazil as the Middle East's leading meat supplier by adopting the modern standards and be developing marketing strategies.

Iran, in particular, seems to be keen for Pakistani beef. The Iranian government has invested 50 per cent of the capital in the Lahore Meat Company, a dedicated abattoir that will export meat to Iran. Australian beef, with a powerful branding effort and a larger source animal, has a specific niche market that industry experts believe will be difficult for Pakistan to compete with in the medium term.

India, the one country that could completely destroy Pakistan's potential in the meat trade, has placed itself outside the global beef market after a 2005 Indian Supreme Court ruling that upheld a ban on cow slaughter as constitutional. Indian exporters only sell carabeef (meat from buffalo) which is considered inferior and commands lower prices and margins.



Nevertheless, Indian exporters dominate the market in Malaysia for the lower end of beef, while Australians command the higher end.

Malaysia is ripe for a middle-market meat supplier from Pakistan. Malaysia has had a free-trade agreement with Pakistan since 2007 ²³. The total market for meat products in the Middle East is currently estimated at US\$ 12 billion while the international market for “halal” foods is estimated at US\$ 200 billion which is expected to grow to US\$500 billion in the next few years. Middle Eastern countries especially provide a good opportunity for Pakistan as a supplier of Live Cattle and Meat. The Supply and Demand Gap for the Middle East is shown below:

Table: Production & Consumption of Meat & Meat Products in Middle East

| (000 Tons) | | | |
|--------------|------------|-------------|--------|
| Country | Production | Consumption | GAP |
| Saudi Arabia | 25,630 | 75,630 | 50,000 |
| Egypt | 440,000 | 533,000 | 93,000 |
| Bahrain | 1,440 | 4,600 | 3,220 |
| Oman | 4,148 | 18,000 | 13,852 |
| UAE | 9,500 | 43,185 | 33,685 |

Source: United States Department of Agriculture

8.3 Companies in Pakistan

Several companies from Pakistan have entered the red meat export business and even more are in the process of entering the market. The oldest and one of the most successful of these is PK Livestock, a Karachi-based abattoir which has been exporting red meat to the Middle East for over two decades.

Zenith, a Lahore-based exporter, became the first Pakistani company to sell beef to Malaysia, after the Malaysian government relaxed its regulatory requirements for Pakistani exporters.

Others, such as OMC and the Al Shaheer Corporation, have also successfully begun exporting to the Middle East and are aggressively seeking regulatory approvals for markets further afield in Southeast Asia. The major export companies of meat in Pakistan are:

²³ *Cattle Farming & Meat Processing Plant. Concept Paper Series, Agriculture & Agro-Food. Version 1, Serial No. AAF-1, ministry of Finance. Government of Pakistan.*

- Tazij Foods & Meat
- Zenith
- Three Start Meat Company
- Abedin International
- PAMCO
- Al-Shaheer
- Lahore Meat Company (LMC)
- AL Rehman Meat Processors
- Bibijan
- K&Ns

Pakistan's total meat exports came close to \$295.5 million in 2019 and surpassed the \$500 million mark in about five years, according to projections by ASI Partners.

8.4 Poultry Processing

Commercial Poultry in Pakistan was established in 1962. It is one of the largest agro based segment of Pakistan having an investment of more than 750 Billion rupees. Poultry Industry of Pakistan is making a tremendous contribution in bridging the gap between supply and demand of meat protein. With the continuous depletion of supply of red meat, poultry is the cheapest available animal protein source for our masses and as such is an effective check upon the spiraling animal protein prices. Therefore we are already consuming less protein as per required standards. Poultry Industry generates employment and provides source of income to more than 1.5 million people of Pakistan directly & indirectly.²⁴

Scope In Poultry Industry

There is a great scope for interventions in grandparent, breeder and commercial poultry breeding exists for foreign investments. There is a great need of establishing of exotic poultry, grand parent, breeding services and meat processing plants in Pakistan. There is a greater scope in establishment of poultry and meat disease diagnostic laboratories in Pakistan also the centers for skill development.

The Challenges

Yet for all their successes, Pakistani meat exporters are severely handicapped compared to their Brazilian, Australian and even Indian competitors.

Despite having the eighth largest herd of cattle and the third largest herd of goats in the world, Pakistan's animal population is very scattered, which makes procurement of the animals for the abattoir expensive.

But perhaps the single biggest challenge is regulatory: meat importing nations have strict health codes for the safety of the meat, including a requirement to be able to trace the meat of any diseased animal down to the exact location that it came from, so that the entire

²⁴ *Pakistan Poultry Association*

herd it was a part of can be slaughtered. This traceability is something that Pakistani herds lack, because the government has not yet invested in tracking and cataloguing the country's animal population.

To their credit, the provincial governments of Punjab and Sindh have been actively promoting the livestock sector. Given the fact that the sector employs 17 per cent of the country's workforce, an effort to improve the productivity and marketability of the industry's products is a welcome attempt to help improve the incomes of some of the most vulnerable Pakistanis.

8.5 Import requirements for meat and meat products of different countries:

a. Middle east:

The gulf countries allow meat and meat products if they following requirements are fulfilled:²⁵

- Bill of Entry or Airway Bill.
- Delivery Order in case of containers only.
- An original Health Certificate approved by the governmental health authority at the country of origin.
- Consignment packing list.
- An original Halal Certificate issued by an Islamic Organization which is approved by UAE authorities (for meat or poultry and products thereof).
- Any other certificates which might be required in case of any international epidemics or any certificates required based on local decisions (such as GMO-Free Certificates, Avian Flu-Free Certificates, Dioxin – Free Certificates, etc.)

b. Malaysia:

Meat, edible meat offal, poultry, edible poultry offal, shrimps, prawns, crabs and lobsters imported into this country must be accompanied by a HC issued by the competent authority of the exporting country.²⁶

The following prohibited veterinary drug residues are required to be analyzed on every consignment or batch of product of the above said products to be exported to Malaysia and shall be declared on the HC:-

²⁵ *Import and Re-Export Requirements for Foodstuff*. Food Control Department. www.dm.gov.ae

²⁶ *Food Safety and Quality Division Ministry Of Health Malaysia*. Ministry of Health Malaysia. <http://fsq.moh.gov.my>



- β -Agonists and its salts for meat and edible meat offal.
- Nitrofurans and its metabolites for poultry meat and edible poultry offal.

9. CANNED AND PROCESSED FOOD INDUSTRY

While industries of processing and canning of vegetables, meats, and poultry products in Pakistan are presently not standing alongside the major exporters of regional and international markets, its competitive position in terms of surrounded by genres of vegetables producing farmlands, naturally growing poultry and livestock sectors if blended with government special support and focus can make the country a main exporter of canned and processed foods in the world.

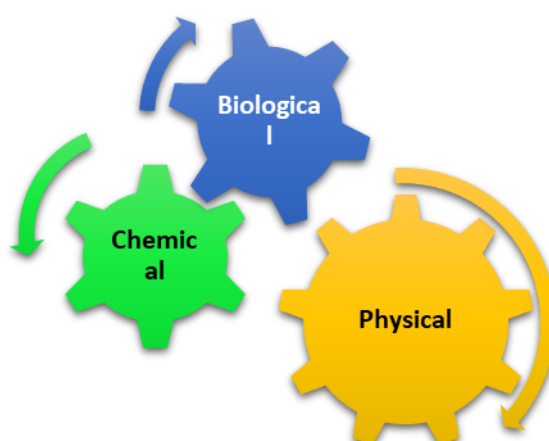
Over \$4.5 billion processed foods trade takes place around the globe presently. The share of Pakistan in total global trade can only be inferred upon the total exports of food groups as no exclusive development category is assigned for processed products in the group export figure, which reveals exports worth \$2.4 billion of rice, fish and fish preparations, fruits, vegetables, pulses, tobacco, wheat, spices, oil seeds, sugar, meat and meat preparations. Officially fish, meat and preparations are considered as separate development categories yet their inclusion in chequered-like reviewable makes it difficult to identify exactly value of processed foods exports.

At present, only few large scale companies are carrying processed foods operations and they are also the major exporters. Most of these companies are based in Karachi, Lahore, and Peshawar. Among them: Shezan, Ahmed Foods, Mitchell's Fruits, Dittu's & Sons, Tasty Food Products, KK and Limited, Frontier canning company, Iqbal Business center, Hunza valley, and Hattar industry are preparing processed foods.

9.1 Food Processing & Value Addition

Food processing involves any type of value addition to the agricultural produce starting at the post-harvest level.

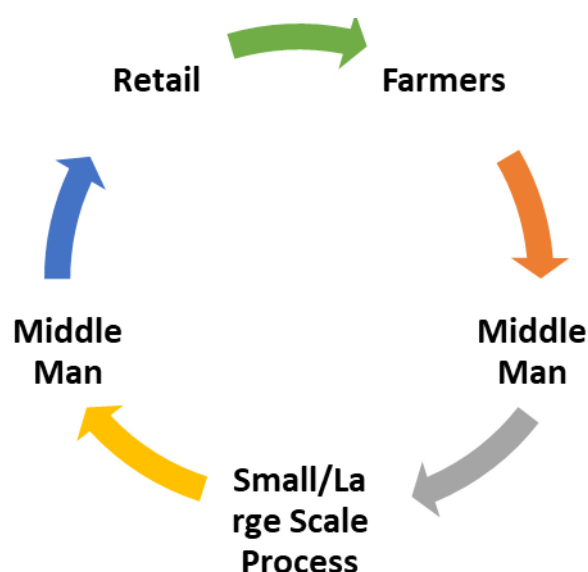
Figure: Value Addition in Food Processing



The value of farm products can be increased through any of the following routed singly or in combination:

- Cleaning & Cooling
- Processing
- Distributing
- Churning
- Culturing
- Grinding
- Hulling
- Extracting
- Drying
- Smoking
- Labelling
- Packaging

Figure: Traditional Approach to Food Processing



Pakistan's food sector is changing significantly with an inclined shift in lifestyles and traditional eating habits. Average consumer spends 42% of one's income on food. Retail sales of processed foods is expanding by 10% per annum and currently are estimated at about US\$1.4 billion, of which imported products account for US\$325 million.

Table: Value Added Products

| Commodity | Value Added Products |
|----------------------------|--|
| Cereals | Biscuits, Starch, Glucose etc. |
| Fruits & Vegetables | Jams, Squashes, Syrups etc. |
| Oil Seeds & Vegetable Oils | Specialty Fats, Shortenings, Margarines etc. |
| Sugarcane | White Sugar, Brown Sugar, Refined Sugar, Chip Board & Paper |
| Milk & Dairy | Whole Milk Powder, Skimmed Milk Powder, Condensed Milk, Ice Cream, Butter & Ghee |

Meat & Poultry

Gelatin & Sausages etc.

9.2 Major Problems Faced by Food Processing Industry of Pakistan

The major challenges faced by the food processing industry of Pakistan are identified as follows:

- Insufficient Raw Material Supply
- Inadequate Safety Standards
- Poor Financial Support
- Erratic Inputs and Poor Artisan Skills
- Lack of Innovation and Poor Technology

Post-harvest losses in food grains are 15-18% and in fruits and vegetables they are accounted as 20-40% due to lack of storage and transport facilities and infrastructure. Frequent failure and or interruption of power supply also effect the fast moving consumer goods sector. Lack of adequate trained manpower Poor quality of the products and lack of research results in the poor quality of the finished products.

9.3 OPPORTUNITIES IN FOOD PROCESSING SECTOR OF PAKISTAN

A reasonable work has been done in Pakistan on secondary processing of agricultural produce, however, the area of primary processing of agriculture produce is not yet developed, therefore, tremendous potential exists in this area.²⁷

The key low-cost technologies needed are as follows:

- Seed / grain drying, aeration and storage technology
- Application of extrusion technology in cereals
- Rice drying technology for obtaining higher head rice yield
- Efficient dal (pulses) processing technology
- Rice par-boiling technology
- Apricot and dates drying and processing technology
- Modified atmosphere technology for fruits and vegetables
- Pre-cooling technology for fruits and vegetables

²⁷ *Value Addition in Pakistan Value Addition in Pakistan - Challenges and Opportunities*. Dr. Faqir Muhammad, National Institute of Food Science & Technology, University of Agriculture, Faisalabad, Pakistan. <http://www.uaf.edu.pk>



- Cool stores for potatoes, citrus, and apples
- Fruits and vegetables cleaning, grading, and packing technology
- Small-scale fruit juice technology for the remote fruit growing areas.

10. FROZEN FOOD INDUSTRY

Rampant pace of lifestyle and dealing with work leaves lesser time to indulge in delicacies. The fact remain concurrent in every part of the consumers' society, which is why frozen foods are set to gain substantial importance. Easier and speedier procedure to cook and eat these products has promoted their use to almost every other consumer. The frozen food market size was valued at \$291.8 billion in 2019, and is estimated to reach \$404.8 billion by 2027, registering a CAGR of 4.2% from 2020 to 2027.²⁸ The growth is significant and is driven by two factors: first the necessary pressures which have forced consumers to eat more at home, and secondly frozen foods brands offer more wholesome and nutrient rich options.

10.1 A Brief Overview of the Global Frozen Food Industry

Frozen food is referred to the food products that can be stored in low temperature over a long period. The popular frozen food products include frozen ready-to-eat meals, fruits & vegetables, meat & poultry, and soups. Global frozen food market comprises retail as well as business customers. Retail consumers of frozen food are individuals and households, whereas business consumers include hotel chains, fast food outlets, caterers, and other business buyers. Retail customers prefer cooked and semi-cooked ready-to-eat food, meat, and soups. On the contrary, business customers majorly use frozen meat, seafood, frozen pizza crust, bread, frozen dough, potatoes, and vegetables as key ingredients for preparing food for end customers. Regionally, Europe is the largest market for frozen food, closely followed by North America.

10.2 GLOBAL KEY MARKET PLAYERS

Growing consumption of frozen foods is urging companies to produce sustainable and durable food products. Leading companies in the global food & beverages industry are slated to participate in the growth of global frozen foods market by dedicating a division towards the production of such food products. So much so, that the contribution of top four companies in the global frozen foods market is anticipated to be 19% collectively. While Nestle and H.J. Heinz Company are among these four, other key companies include, ConAgra Foods Inc., Maple Leaf Foods Inc., General Mills, BRF SA (Brazil), Tyson Foods Inc., Mother Dairy Fruit & Vegetable Pvt. Ltd. (India), Pinnacle Foods Inc., Ajinomoto Co. Inc., Kraft Foods Group Inc., and Unilever PLC, among others²⁹.

10.3 EVOLUTION OF THE FROZEN FOODS INDUSTRY IN PAKISTAN

The frozen food industry in Pakistan can be classified into four categories/segments based on

²⁸ DUBLIN--(BUSINESS WIRE)--The "Frozen Food Market by Product Type and User: Global Opportunity Analysis and Industry Forecast, 2020-2027

²⁹ Global Market Study on Frozen Foods: Rising Urbanization to Foster Expansion of Frozen Foods Market in Asia-Pacific. <http://www.persistencemarketresearch.com/market-research/frozen-food-market.asp>



the usage of raw material:

- Milk/water based products; ice cream/desserts, henceforth referred to as ice-cream.
- Meat based products; raw/ processed/ cooked, value added, chicken/beef/mutton/fish products.
- Fruits and vegetable based products; raw and processed, carrots, peas, spinach etc.
- Wheat based products; Parathas,³⁰ samosas etc.

Pakistan Frozen Food Market is segmented by Product category into ready-to-eat, ready-to-cook, ready-to-drink, and other frozen food types; by type into frozen fruits and vegetables, frozen meat and fish, frozen-cooked ready meals, frozen desserts, frozen snacks, and other applications; by freezing Technique into individual quick freezing (IQF), blast freezing, belt freezing, and other freezing techniques; and by distribution channel into Supermarkets & Hypermarkets, Convenience Stores, Online Channels, and Others.

Pakistani frozen food market is growing at a CAGR of 5.8% during the forecast period (2020-2025).

The frozen food market in Pakistan is preliminarily driven by the convenience factor and the rising demand for animal-based products, such as kebab, parathas, meatballs, sausages, etc. Meanwhile, lack of infrastructure, in terms of efficient cold chain and retail-level inefficiencies, is considered as a major hurdle for the frozen food industry in Pakistan.

Retail marketing of packaged foods is gradually transforming from a large number of convenience stores or grocery stores to supermarkets/ hypermarkets. The modern retail channels, with the wide availability of products across regional/global brands, have gained popularity. These superstores have facilitated the process of distribution, easing the process of multi-channel marketing for frozen food products.

A list of the current major players in each category is given below:

Table: Leading Frozen Food Brands

| Ice Cream Segment | | Non Ice-Cream Segment | |
|-------------------|---|-----------------------|-------------------------------|
| Milk Based | Meat Based (Chicken, beef, Mutton excluding fish) | Icepac by Icepac Ltd | Wheat Based (Mainly Parathas) |
| Walls by Unilever | K&N"s by K and N | Fine Foods by Metro | Mon Salwa by Quick |

³⁰ A flat bread, similar to a tortilla, having layers of butter or ghee in the dough. It is fried on a girdle in order to eat.

³¹ The range includes both raw frozen chicken and ready to eat chicken meals.

| | | | |
|--------------------------------------|---|---------------------|--------------------------------|
| | Foods, ³¹ Karachi. | | Foods, Karachi |
| Omore by Engro Foods | Menu by Seasons Foods, ³² Lahore. | Aro by Makro | Menu by Seasons Foods, Lahore. |
| Igloo by Pakistan Dairy Products | Mon Salwa ³³ by Quick Foods, Karachi | Fine Foods by Metro | Dawn Foods by Golden Harvests |
| Hico by Pakistan Fruit Juice Company | Dawn Foods by Golden Harvests | - | Super Fresh |
| Yummy by Yummy Milk Products | PK by P.K. Meat and Food Company Ltd | - | Foodmart |

³² The range includes both raw frozen chicken and ready to eat meal in all meat forms.

³³ The range includes ready to eat meals in all meat forms.



11. OIL AND GHEE INDUSTRY

Edible oil and Ghee is one of the most significant food industries and basic nutrition requirement. Vegetable Ghee and Cooking Oil Industry in the beginning was established in the private sector but it was nationalized in 1973 in Pakistan. Out of 26 factories, 23 factories were nationalized and put under the control of Ghee Corporation of Pakistan (GCP). Raw material for vegetable ghee industry is imported because local raw material is not sufficient. Unlike the wheat (and rice, cotton and sugarcane) the oilseed supply is totally neglected. The Pakistan Oilseed Development Board was established in 1995 resulting in boost of local oil production and helped reduction the imports of the edible oil.

The main edible oils consumed in Pakistan are:

- Palm Oil
- Cotton Seed Oil
- Rapeseed Oil
- Mustard Oil
- Sunflower Seed Oil
- Canola Oil

The people mainly prefer sunflower, canola and soybean oil and ghee (a hydrogenated solid vegetable oil).

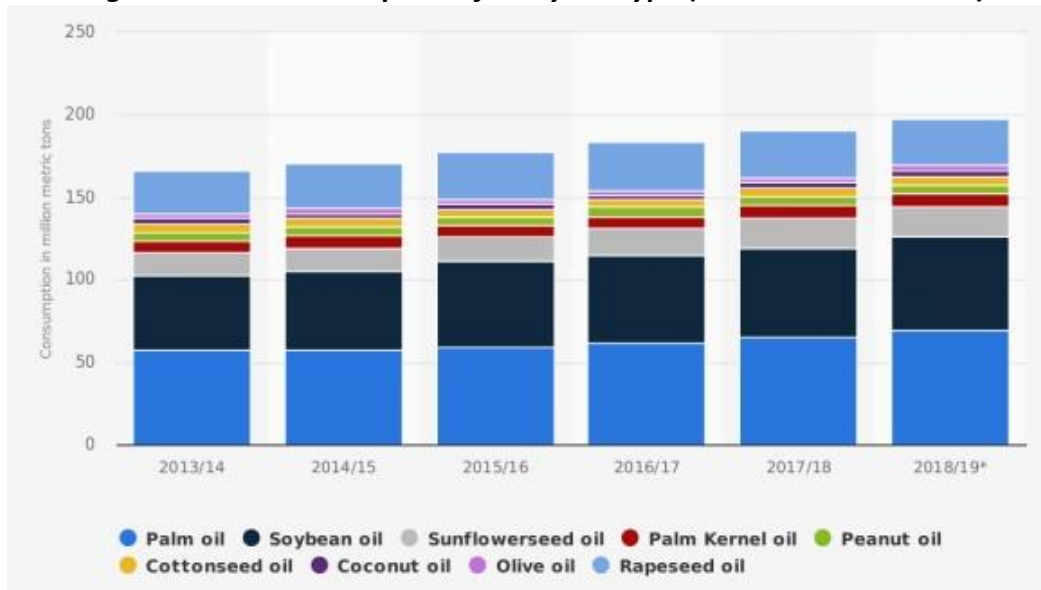
11.1 Global Market

The global edible oil and fats market size was valued at USD 97.32 billion in 2018. The edible oil market share is primarily led by North America and Asia. A major contributing factor is high consumption of packaged food and fast food in these regions.

Urbanization in Asian countries has been favoring demand in the edible oil market in South Asia and East Asia. Changing lifestyles of consumers require products that help them maintain their social status, and the U.S. has seen to be contributing the largest share in the edible oil market by providing a variety of edible oils.

Moreover, manufacturers in the edible oil market space are offering specialized and fortified edible oils in order to boost the health of consumers. Europe and Latin America have shown a positive outlook for the edible oil market. Along with these two regions, the Middle East and Africa has demonstrated increasing growth in the edible oil market.



Figure: Global Consumption of oil by Oil Type (in million metric tons)

*Source: FAOSTAT

At present, palm oil is the main part in edible oil consumption. By 2024, palm oil will remain the largest market, followed by soybean oil. Palm oil is expected to be the cheapest vegetable oil, and the food industry's increased demand for margarine, baked fat, fried fat and cooking oil is the fastest growing.

Largest consuming countries of edible oils in the world are China, India, Brazil, Nigeria, Indonesia and Pakistan. They have significantly contributed to total consumption growth by increasing population and/or expanding per capita intake. At the same time, these countries are also main edible oil production countries.

11.2 Production In Pakistan

Pakistan is the fourth largest edible oil importing country. Pakistan imports 75% of the total edible oil consumed in the country to meet its demand. The edible oil imports composed 94% of Palm Oil and the remaining portion comprises the imports of edible oil, coconut oil, olive oil etc. Pakistan imports 75% of its palm oil from Malaysia making it the biggest trade partner in terms of Palm Oil.³⁴

At present, Pakistan's total oil availability, from locally produced oilseed, 0.56 is MMT annually. However, country's appetite for edible oil hovers around 4.0 MMT annually. 94% of the units are in the private sector. Around 160 small and medium sized vegetable oil and ghee plants are operational with a total capacity of over two million tons. Most of the edible

³⁴ Syed Masroor Hussain Zaidi, 2014. "Edible Oil Imports in Pakistan," *South Asian Journal of Management Sciences (SAJMS)*, Iqra University, Iqra University, vol. 8(1), pages 1-8, Spring.

oil refineries in Pakistan have integrated soap manufacturing and natural gas cracking units besides vegetable ghee and cooking oil-producing facilities. Two institutions in Pakistan represent the edible oil industry. The Pakistan Vanaspati Manufacturing Association (PVMA) is an association of over 100 mills. These mills import refined crude oil: process, package and market it. The total installed capacity of these units is around 1.8 million ton. The All Pakistan Solvent Extraction Association (APSEA) is an association of five mills. These mills process oil from raw oil seed through solvent extraction process. The total installed capacity of these units is around 550,000 tons.³⁵

The industry comprising of over 122 units manufactured over 3.8 Million M. Tons of Banaspati, Cooking Oil and other allied products to cater for the national requirement.

The industry procures entire raw material comprising of Canola, Sunflower, Cotton Seed, Rape Seed and Soy-bean Oil from local Solvent Extraction, Expeller and Refining sectors to augment its import while satisfying national demand.³⁶

³⁵ *World Food Market and Compliance Requirements - Guidelines for Food Industry. SMEDA*

³⁶ <http://www.peoc.com.pk/>



12. SPICES AND CONDIMENTS

Spices are non-leafy parts (e.g. bud, fruit, seed, bark, rhizome, and bulb) of plants used as a flavoring or seasoning, although many can also be used as an herbal medicine. A closely related term, 'herb', is used to distinguish plant parts finding the same uses but derived from leafy or soft flowering parts. The two terms may be used for the same plants in which the fresh leaves are used as herbs, while other dried parts are used as spices, e.g. coriander, dill etc.

The global spices market is growing at an annual growth rate of about 5% (by value) and is projected to exceed \$10 billion by 2020. European imports of spices and herbs from developing countries have grown significantly in recent years. The global seasoning and spices market size was valued at USD 13.77 billion in 2019 and is expected to grow at a compound annual growth rate (CAGR) of 6.3% from 2020 to 2027.

12.1 Spice Industry Of Pakistan

Spice industry in Pakistan is a high demand and growth oriented billion rupees industry. It is an agricultural commodity-based industry. The market size of the industry stands Rs. 40 billion per annum³⁷. Over the period of time, the branded players emerged including National Foods, Shan Foods, Ahmed Foods, Mehran Foods, and some others. The branded sector offers high quality, standardized, and packaged products to the market, developed through homogenous recipes, stern quality control parameters, and international benchmarks.

On the other hand, the unbranded spice sector offers inferior quality and adulterated spices to the market that endangers consumers as the consequences lead to severe ailments among users including stomach ache, gastroenteritis, diarrhea, rash, nausea, mental retardation, cancer, etc.³⁸ As the masses in Pakistan are poor people, so the grocery wholesalers and retailers exploit them by offering cheaper, unpacked, and unbranded spices, which are around thirty percent cheaper than the branded rivals.

Spice industry in Pakistan is one of the major sub-sectors of the food sector. Its market demand, size, consumption, and growth patterns portray a splendid picture. The industry records an amazing growth rate of fifty percent, whereas the market leaders like National Foods Limited and Shan Foods (Private) Limited also thrived at the same rate of the industry. The total demand of spices is met by 85% from domestic production, while the rest of it through imports. Kunri, a small town in Sindh produces 85% of the total yield in Sindh.

In addition to domestic production, spices are imported as well to cater the growing demand.

³⁷ Andrew, M. 2015. *Spicing it up- Exploring Pakistan's spice industry*. Dawn News. May-June 2015.

³⁸ Meghani, S., M. E. Ahmed and N. Ilyas. 2008. *Marketing Management Case Studies in Pakistani Market*, Case Studies Cell, Institute of Business Management, Karachi-Pakistan. pp.12-24.



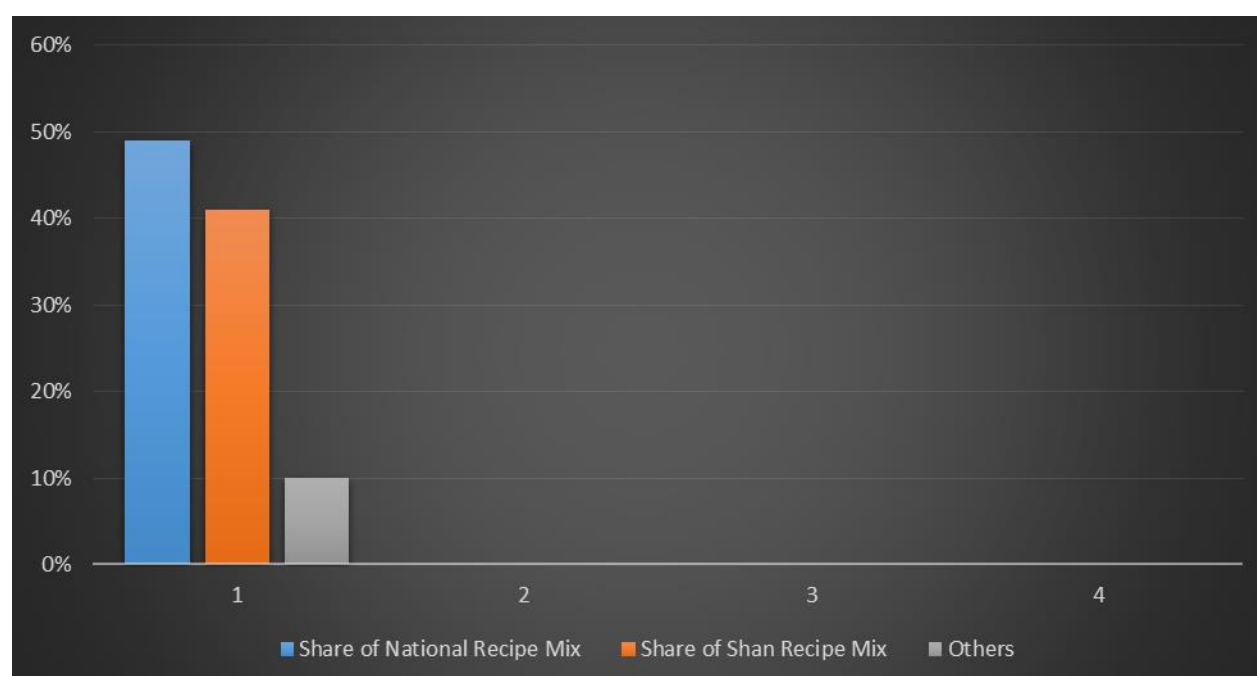
Pakistani spices are exported to South Asia, Middle East, Malaysia, Singapore, Japan, Australia, UK, Germany, Holland, USA, and Canada, etc. Shan Food is a global company from Pakistan that has presence in sixty five countries around five continents and manufacturing facilities in three continents including Asia, Europe, and America. It has officially launched its brands in India as well.³⁹

Table: Spice industry highlights (market size and growth)

| Market size of industry by volume | Market size of industry by value | Annual growth of recipe mix category |
|-----------------------------------|----------------------------------|--------------------------------------|
| 60,000 tons | Rs. 35-40 billion | 15-20 percent |

Source: Pak. J. Agri., Agril. Engg., Vet. Sci., 2016, 32 (2)

Figure 11: Spice Industry Highlights (Market Share)



Source: Pak. J. Agri., Agril. Engg., Vet. Sci., 2016, 32 (2)

Keeping in view the demand value, market size, consumption, and enormous growth of the spice sector in Pakistan and the detrimental effects of adulterated cum sub-standard spices sold through loose or unpacked way, the industry needs to be regulated and branded.

12.2 Overview of the Chili Sector in Pakistan

The Pakistani red chilies belong to the species *Capsicum Annum* L and *Capsicum Frutescens*

³⁹ Shan Foods. 2015. An Overview of Shan Foods. www.shanfoods.com/

L. Pakistan is one of the top five producers of red chili peppers in the world⁴⁰. As such, its potential for meeting local and international demand for chilies is high. Although Pakistan is the 5th largest producer of chilies in the world, it ranks 31st in pepper exporting countries and its exports amount to 0.17% of world exports.⁴¹

Chilies are summer vegetables and the process of cultivation starts in February so that the harvest would be ready in time for picking in summer. Pakistan does not use sophisticated cultivation processes to protect against adverse weather and contamination. The use of protected cultivation is on the rise where vegetables are grown in poly/plastic tunnels to maintain the temperature and weather conditions suitable for healthy growth. Although in use in Pakistan, this technique has not fully caught on and red chili is still cultivated in open fields in many areas. The unheated poly/plastic tunnel technology is especially suitable for the climate conditions of Punjab with its high likelihood of rain.⁴²

Table 13: Area Wise Cultivation of Chili

| Province | Location | Percentage of Total % |
|---------------------------|--|-----------------------|
| Sindh | District Umerkot – Kunri Town, Badin, Mirpur Khas, Ghotki, Khairpur, Karachi outskirts, Thatta, Hyderabad, Larkana, Dadu, Shikarpur, Sanghar, Sukkur, Nawabshah, Jaacobabad, Halla | 82.0 |
| Punjab | Attock, Rawalpindi, Jehlum, Chakwal, Talagang, Gujranwala, Lahore, Okara, Sargodah, Mianwali, Sahiwal, Faisalabad, Jhang, Chiniot, Vehari, Sailkot, Narowal, Bhurewala, Khanewal, Multan, Bahawapur, D.G. Khan, Muzafargarh, Rahim Yar Khan, Lodhran | 10.6 |
| Baluchistan | Quetta, Sibbi, Kalat, Mastung, Kachi, Loralai | 6.1 |
| Khyber Pakhtunkhwa | Malakand Agency, Swat, Charsadda, Mardan, Peshawar, Shinkyari, Haripur, Mansehra, Kohat, Karak, Bannu, Lakki Marwat, Hangu, D.I. Khan | 1.3 |

Source: PES (2014); *P: Provisional (July 2013 – March 2014)

12.3 Chili Processing and Investment Opportunities for Smes

There are various opportunities in chili processing that can be availed by investors in Pakistan. With a clear and present foreign market, investors would be happy to invest if their

⁴⁰ SBI. (2012). *Red Chillies - Sindh: The Land of Opportunities*. Sindh Board of Investment. Karachi: Government of Sindh.

⁴¹ *Food Processing Sector in Pakistan*. Switzerland Global Enterprise. <http://www.s-ge.com>

⁴² (2009). *Biometric and Biochemical Studies on Hot Pepper*. Thesis, Institute of Horticultural Sciences, University of Agriculture, Faisalabad.



product is compatible and able to pass the quality measures. Investors would find opportunities in chili powder processing, pickled pepper processing, chili paste processing, and chili sauce processing plants. In order to make these attractive for investors, it is suggested that assistance be provided in terms of collaboration with investors to improve cultivation conditions for farmers and to create awareness among domestic consumers of the harmful effects of contaminated chilies. Another venue for investors' interest is to make the prospect of export market attractive by providing assistance through linkages to large commodity houses and other export means.

13. FOOD SAFETY

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent foodborne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. In this way food safety often overlaps with food defense to prevent harm to consumers. The tracks within this line of thought are safety between industry and the market and then between the market and the consumer. In considering industry to market practices, food safety considerations include the origins of food including the practices relating to food labeling, food hygiene, food additives and pesticide residues, as well as policies on biotechnology and food and guidelines for the management of governmental import and export inspection and certification systems for foods. In considering market to consumer practices, the usual thought is that food ought to be safe in the market and the concern is safe delivery and preparation of the food for the consumer.

Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning. In developed countries there are intricate standards for food preparation, whereas in lesser developed countries the main issue is simply the availability of adequate safe water, which is usually a critical item.⁴³ In theory, food poisoning is 100% preventable. The five key principles of food hygiene, according to WHO, are:⁴⁴

Prevent contaminating food with pathogens spreading from people, pets, and pests.

- Separate raw and cooked foods to prevent contaminating the cooked foods.
- Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.
- Store food at the proper temperature.
- Do use safe water and safe raw materials.

13.1 Regulations by Jurisdiction and Agency

WHO & FAO

In 1963, the WHO and FAO published the Codex Alimentarius which serves as a guideline to food safety. However, according to Unit 04 - Communication of Health & Consumers Directorate-General of the European Commission (SANCO): "The Codex, while being recommendations for voluntary application by members, Codex standards serve in many cases as a basis for national legislation. The reference made to Codex food safety standards

⁴³ Shiklomanov, I. A. (2000). *"Appraisal and Assessment of World Water Resources"*(PDF). Water International. International Water Resources Association. pp. 11–32.

⁴⁴ *"Prevention of foodborne disease: Five keys to safer food"*. World Health Organization. Retrieved 2010-12-10.

in the World Trade Organizations' Agreement on Sanitary and Phytosanitary measures (SPS Agreement) means that Codex has far reaching implications for resolving trade disputes. WTO members that wish to apply stricter food safety measures than those set by Codex may be required to justify these measures scientifically." So, an agreement made in 2003, signed by all member states, inclusive all EU, in the codex Stan Codex 240 – 2003 for coconut milk, sulphite containing additives like E223 and E 224 are allowed till 30 mg/kg, does NOT mean, they are allowed into the EU, see RASFF entries from Denmark: 2012.0834; 2011.1848; en 2011.168, "sulphite unauthorized in coconut milk from Thailand ". Same for polysorbate E 435: see 2012.0838 from Denmark, unauthorized polysorbates in coconut milk and, 2007.AIC from France. Only for the latter the EU amended its regulations with (EU) No 583/2012 per 2 July 2012 to allow this additive, already used for decades and absolutely necessary.

Australia & New Zealand

Food Standards Australia New Zealand requires all food businesses to implement food safety systems. These systems are designed to ensure food is safe to consume and halt the increasing incidence of food poisoning, and they include basic food safety training for at least one person in each business. Food safety training is delivered in various forms by, among other organizations, Registered Training Organizations (RTOs), after which staff are issued a nationally recognized unit of competency code on their certificate. Basic food safety training includes:

- Understanding the hazards associated with the main types of food and the conditions to prevent the growth of bacteria which can cause food poisoning and to prevent illness.
- Potential problems associated with product packaging such as leaks in vacuum packs, damage to packaging or pest infestation, as well as problems and diseases spread by pests.
- Safe food handling. This includes safe procedures for each process such as receiving, re-packing, food storage, preparation and cooking, cooling and re-heating, displaying products, handling products when serving customers, packaging, cleaning and sanitizing, pest control, transport and delivery. Also covers potential causes of cross contamination.
- Catering for customers who are particularly at risk of food-borne illness, as well as those with allergies or intolerance.
- Correct cleaning and sanitizing procedures, cleaning products and their correct use, and the storage of cleaning items such as brushes, mops and cloths.
- Personal hygiene, hand washing, illness, and protective clothing.

Food safety standards and requirements are set out at the national level in the Food



Standards Code, and brought into force in each state by state-based Acts and Regulations. Legislation means that people responsible for selling or serving unsafe food may be liable for heavy fines.

China

Food safety is a growing concern in Chinese agriculture. The Chinese government oversees agricultural production as well as the manufacture of food packaging, containers, chemical additives, drug production, and business regulation. In recent years, the Chinese government attempted to consolidate food regulation with the creation of the State Food and Drug Administration in 2003, and officials have also been under increasing public and international pressure to solve food safety problems. However, it appears that regulations are not well known by the trade. Labels used for "green" food, "organic" food and "pollution-free" food are not well recognized by traders and many are unclear about their meaning. A survey by the World Bank found that supermarket managers had difficulty in obtaining produce that met safety requirements and found that a high percentage of produce did not comply with established standards.⁴⁵

Traditional marketing systems, whether in China or the rest of Asia, presently provide little motivation or incentive for individual farmers to make improvements to either quality or safety as their produce tends to get grouped together with standard products as it progresses through the marketing channel. Direct linkages between farmer groups and traders or ultimate buyers, such as supermarkets, can help avoid this problem. Governments need to improve the condition of many markets through upgrading management and reinvesting market fees in physical infrastructure. Wholesale markets need to investigate the feasibility of developing separate sections to handle fruits and vegetables that meet defined safety and quality standards.⁴⁶

European Union

The parliament of the European Union (EU) makes legislation in the form of directives and regulations, many of which are mandatory for member states and which therefore must be incorporated into individual countries' national legislation. As a very large organization that exists to remove barriers to trade between member states, and into which individual member states have only a proportional influence, the outcome is often seen as an excessively bureaucratic 'one size fits all' approach. However, in relation to food safety the tendency to err on the side of maximum protection for the consumer may be seen as a

⁴⁵ *"China's Compliance with Food Safety Requirements for Fruits and Vegetables: Promoting Food Safety, Competitiveness, and Poverty Reduction"* (PDF). World Bank and China Agriculture Press. 2005.

⁴⁶ Shepherd, Andrew W. (2006). *"Quality and safety in the traditional horticultural marketing chains of Asia"* (PDF). Rome: Food and Agriculture Organization of the United Nations.

positive benefit. The EU parliament is informed on food safety matters by the European Food Safety Authority.

Individual member states may also have other legislation and controls in respect of food safety, provided that they do not prevent trade with other states, and can differ considerably in their internal structures and approaches to the regulatory control of food safety.

From 13 December 2014, new legislation - the EU Food Information for Consumers Regulation 1169/2011 - require food businesses to provide allergy information on food sold unpackaged, in for example catering outlets, deli counters, bakeries and sandwich bars.⁴⁷

South Korea

Korea Food & Drug Administration (KFDA)⁴⁸ is working for food safety since 1945. It is part of the Government of South Korea. IOAS⁴⁹ - Organic Certification Bodies Registered in KFDA: "Organic" or related claims can be labelled on food products when organic certificates are considered as valid by KFDA. KFDA admits organic certificates which can be issued by

- 1) IFOAM (International Federation of Organic Agriculture Movement) accredited certification bodies.
- 2) Government accredited certification bodies – 328 bodies in 29 countries have been registered in KFDA.

According to Food Import Report,⁵⁰ it is supposed to report or register what you import. Competent authority is as follows:

Table: Authorities Managing the Import of Different Products in Korea

| Product | Authority |
|---|---|
| Imported Agricultural Products, Processed Foods, Food Additives, Utensils, Containers & Packages or Health Functional Foods | KFDA (Korea Food and Drug Administration) |
| Imported Livestock, Livestock products (including Dairy products) | NVRQS (National Veterinary Research and Quarantine Service) |
| Packaged meat, milk & dairy products (butter, cheese), hamburger patties, meat ball and other processed products | NVRQS (National Veterinary Research and Quarantine) |

⁴⁷ <http://www.food.gov.uk/business-industry/allergy-guide>

⁴⁸ <http://www.kfda.go.kr/>

⁴⁹ "IFOAM Accredited Certification Bodies" (PDF). International Organic Accreditation Service. Korea Food and Drug Administration. 2008-02-14.

⁵⁰ "Foods Import Report Guide" (PDF). Korea Food and Drug Administration. 2010-10-22.



| | |
|--|---|
| which are stipulated by Livestock Sanitation Management Act | Service) |
| Imported Marine products; fresh, chilled, frozen, salted, dehydrated, eviscerated marine produce which can be recognized its characteristics | NFIS (National Fisheries Products Quality Inspection Service) |

Source: Foods Import Report Guide. Korea Food and Drug Administration

USA

The Food and Drug Administration publishes the Food Code, a model set of guidelines and procedures that assists food control jurisdictions by providing a scientifically sound technical and legal basis for regulating the retail and food service industries, including restaurants, grocery stores and institutional foodservice providers such as nursing homes. Regulatory agencies at all levels of government in the United States use the FDA Food Code to develop or update food safety rules in their jurisdictions that are consistent with national food regulatory policy. According to the FDA, 48 of 56 states and territories, representing 79% of the U.S. population, have adopted food codes patterned after one of the five versions of the Food Code, beginning with the 1993 edition.⁵¹

In the United States, federal regulations governing food safety are fragmented and complicated, according to a February 2007 report from the Government Accountability Office.⁵² There are 15 agencies sharing oversight responsibilities in the food safety system, although the two primary agencies are the U.S. Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS), which is responsible for the safety of meat, poultry, and processed egg products, and the Food and Drug Administration (FDA), which is responsible for virtually all other foods.

⁵¹ "FDA Food Code". Food and Drug Administration. 2007-10-05. Retrieved 2008-09-01.

⁵² "High-Risk Designation Can Bring Needed Attention to Fragmented System" (PDF). Federal Oversight of Food Safety. Government Accountability Office.



14. FOOD LAWS, REGULATIONS & AUTHORITIES IN PAKISTAN

Pakistan does not have an integrated legal framework but has a set of laws, which deals with various aspects of food safety. These laws, despite the fact that they were enacted long time ago, have tremendous capacity to achieve at least minimum level of food safety. However, like many other laws, these laws remain very poorly enforced. There are four laws that specifically deal with food safety. Three of these laws directly focus issues related to food safety, while the fourth, the Pakistan Standards and Quality Control Authority Act, is indirectly relevant to food safety.

The Pure Food Ordinance 1960 consolidates and amends the law in relation to the preparation and the sale of foods. All provinces and some northern areas have adopted this law with certain amendments. Its aim is to ensure purity of food being supplied to people in the market and, therefore, provides for preventing adulteration. The Pure Food Ordinance 1960 does not apply to cantonment areas. There is a separate law for cantonments called "The Cantonment Pure Food Act, 1966". There is no substantial difference between the Pure Food Ordinance 1960 and The Cantonment Pure Food Act. Even the rules of operation are very much similar.

Pakistan Hotels and Restaurant Act, 1976 applies to all hotels and restaurants in Pakistan and seeks to control and regulate the rates and standard of service(s) by hotels and restaurants. In addition to other provisions, under section 22(2), the sale of food or beverages that are contaminated, not prepared hygienically or served in utensils that are not hygienic or clean is an offense. There are no express provisions for consumer complaints in the Pakistan Restaurants Act, 1976, Pakistan Penal Code, 1860 and Pakistan Standards and Quality Control Authority Act, 1996.⁵³

Pakistan food imports are regulated by the federal government of Pakistan while Food safety standards and controls are regulated by the provincial governments after the 18th constitutional amendment.

14.1 Pakistan Standards and Quality Control Authority (PSQCA)

The PSQCA Act 1996 of the Parliament empowers Pakistan Standards & Quality Control Authority, as National Standard Body of Pakistan under the administrative control of Ministry of Science & Technology.⁵⁴ The PSQCA and Government of Pakistan have adopted 22070 ISO Standards and developed 8857 Pakistan Standards. Food Standards are aligned with Codex Alimentarius Commission and traceable with WHO. These standards are on Food items and related products. The Government of Pakistan has declared 107 products as mandatory out

⁵³ Siraj, Mazhar (2004). *"Food Safety Legislation in Pakistan"* (DOC). Consumer Rights Commission of Pakistan.

⁵⁴ <http://www.psqca.com.pk/index.html>



of which 37 are food products which are as follows:⁵⁵

Table: Conformity Assessment. List of Food Items with Codes

| Subject | PSS # |
|--|-----------------|
| Apple Juice | PS: 1738 - 2000 |
| Banaspati | 221 |
| Biscuits (Excluding Wafer Biscuits) | 383 |
| Butter | PS: 1831 - 1997 |
| Carbonated Beverages | 1654 |
| Bottled Drinking Water | 4639 |
| Cooking Oil (Blended) | 2858 |
| Cotton Seed Oil Cake Expeller Type | 96 |
| Chili Powder | PS: 1742 - 1997 |
| Concentrated Fruit Juice | PS: 527 - 1992 |
| Condensed Milk | PS: 364 - 1991 |
| Curry Powder | PS: 1741 - 1997 |
| Edible Sesame Seed Oil | 98 |
| Food for Infants and Children | PS: 1688 - 1985 |
| Flavored Milk | PS: 3189 - 1992 |
| Fruit Squash | PS: 506 - 1997 |
| Honey | PS: 1934 - 2007 |
| Iodized Salt | 1669 |
| Jams (Fruit preserve) & Jellies | PS: 2096 - 1989 |
| Margarine | 1653 |
| Mayonnaise | PS: 3947 - 1997 |
| Marmalade | PS: 514 - 1985 |
| Milk Powder (whole and Skim) | PS: 363 - 1991 |
| Natural Mineral Water | 2102 |
| Orange Juice | PS: 1738 - 2000 |
| Palm oil (Edible grade for cooking purposes) | 1561 |
| Refined Coconut Oil | 99 |
| Refined Cotton Seed Oil | 21 |

⁵⁵ http://www.psqca.com.pk/compulsory_items.html

| | |
|----------------------------|-----------------|
| Refined Maize Corn Oil | 1562 |
| Refined Mustard Oil | 25 |
| Refined Soya bean Oil | 1563 |
| Refined Sunflower Oil | 1564 |
| Refine Sugar & White Sugar | PS: 1822 - 2007 |
| Synthetic Vinegar | PS: 3602 - 1994 |
| Tea Black | PS: 493 - 2000 |
| Wafers Biscuits | PS: 614 |
| Packaged Liquid Milk | PS: 5344 - 2016 |

i. Components of PSQCA

Standards Development Centre (SDC)

Ensures Formulation of National Standards as per mandate of the PSQCA Act, keeping in view the concept of quality, safety, health efficiency as basic parameters for the sustainable development.

Quality Control Centre (QCC)

The QCC undertakes testing of industrial raw material and finished products for conformity assessment to establish their quality, with reference to national/international standards.

Technical Services Centre (TSC)

The TSC is focused on research and development on metal and metallurgical industrial products.

System Certification Centre (SCC)

Pakistan Standards and Quality Control Authority (PSQCA), being responsible to develop and strengthen the Quality Infrastructure of Pakistan, has established System Certification Centre (SCC). SCC is an independent operational arm of PSQCA. Main responsibility of SCC is to provide certification and training services to local SMEs in particular and all businesses in general in the areas of Management System Standards.

ii. Global Affiliation

PSQCA is subscribing member of:

- International Organization for Standardization (ISO) Geneva, Switzerland (CHF 46,208/- p.a.)
- International Electrotechnical Commission (IEC) Geneva, Switzerland (CHF 95,700/- p.a.)



- International Organization for Legal Metrology (OIML) Paris, France (Euro 12,400/- p.a.)
- PSQCA as National Standards Body is represented in World Trade Organization (WTO) on TBT agreement.
- PSQCA has membership with (IECEE) Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components.

PSQCA has signed following MoU's & MRA 's with various international organizations for cooperation in the fields of Science & Technology, Standardization, Quality Assurance /Management, Technical Barriers to Trade, Product Certification and exchange of technical information, human resource development and capacity building.

- Islamic Republic of Pakistan and Kingdom of Morocco.
- Islamic Republic of Pakistan and Kingdom of Saudi Arabia.
- Islamic Republic of Pakistan and People's Democratic Republic of Algeria.
- Islamic Republic of Pakistan and Democratic Socialist Republic of Sri Lanka.
- PSQCA and Turkish Standards Institution (TSE).
- MoU signed between PSQCA and American Society for Testing and Material (ASTM), USA.
- MoU signed between PSQCA and Deutsches Institut für Normung (DIN), Germany.
- MoU signed between PSQCA and American National Standards Institute (ANSI).

14.2 Pakistan National Accreditation Council (PNAC)

The Pakistan National Accreditation Council (PNAC) has been established under the administrative control of the Ministry of Science and Technology, Government of Pakistan as the national apex agency to accredit conformity assessment bodies such as laboratories and certification bodies. PNAC was established in 1998 after signing WTO in 1995. The accreditation services of PNAC were launched during the year 2001. PNAC achieved a milestone of Mutual Recognition Arrangement (MRA) with International Laboratory Accreditation Cooperation (ILAC) and Asia Pacific Laboratory Accreditation Cooperation (APLAC) in 2009 and MLA status in 2013. Now Pakistan is included in the list of countries having equivalent status for accreditation of testing & calibration laboratories and certification bodies for QMS & EMS all over the world.⁵⁶

⁵⁶ <http://pnac.org.pk/introduction/>

Benefits of Accreditation

The International Markets are of fundamental importance to Pakistan. The PNAC's activities ensure that accredited certificates and test results produced here are acceptable throughout the World. This eliminates the need for multiple assessments when goods cross frontiers, giving Pakistan industry the best competitive advantage possible in what is an ever-expanding and aggressive market place. Build confidence of the consumers in a product or service certified by an accredited CAB and facilitate the regulators in maintaining security, health, safety, environment and other such requirements.⁵⁷

14.3 Provincial Food Authorities

1) Punjab Food Authority

The Punjab Food Authority (PFA) is an agency of the provincial Government of Punjab in Pakistan. It regulates food safety and hygiene in the Province. It was formed under the Punjab Food Authority Act 2011. The main role of this department is to lay out standards for food articles and to regulate their manufacturing, Storage, distribution, sale and import.

2) Kp Food Safety and Halal Food Authority

KP food Safety Authority was established under the Khyber Pakhtunkhwa Food Safety Authority Act, 2014. The Food Safety Authority regulates and monitors the food business in order to ensure provision of safe food.

3) Sindh Food Authority

The Sindh Assembly recently in March 2017, unanimously adopted a government bill to establish a food authority in the province to ensure provision of safe and hygienic food to the people. The Sindh Food Authority Bill, 2016, which was turned into an act resulting in the establishment of Sindh Food Authority which works directly under the Provincial Food Minister.

4) Balochistan Food Authority

Balochistan Food Authority was established under the Balochistan Food Authority Act, 2014. After the establishment of Balochistan Food Authority all packed and unpacked food items as well as restaurants came under scrutiny to ensure provision of hygienic food in the province.

Main Role Of Provincial Food Authorities

Main functions of Provincial Food Authorities are:

- To formulate or adopt standards, procedures, processes and guidelines in relation to any aspect of food including food business, food labeling, food additive, and specify

⁵⁷ <http://pnac.org.pk/benefits-of-accreditation/>

appropriate enforcement systems.

- To specify procedures and guidelines for setting up and accreditation of food laboratories.
- To formulate method of sampling, analysis of samples and reporting of results.
- To specify licensing, prohibition orders, recall procedures, improvement notices and prosecution.
- To determine terms and conditions of service of its employees.
- To provide scientific advice and technical support to the respective Governments in matters relating to food.
- To collect and analyze relevant scientific and technical data relating to food.
- To establish a database and information system of network of food operators and consumers to facilitate food safety and quality control.
- To organize training programs in food safety and standards.
- To promote general awareness about food safety and standards.
- Levy fee for registration, licensing and other services.
- To certify food for export.
- To establish safe limits (maximum permissible limits–MRLs) for processing residues in the foods.
- To implement rules and regulations relating to:
 - a) Genetically modified foods
 - b) Irradiated foods
 - c) Fortified foods
 - d) Organic foods
 - e) Foods for special dietary needs
 - f) Functional foods
 - g) Nutraceuticals
 - h) Health supplements
 - i) Proprietary and noval foods
 - j) Beverages
 - k) Ordinary foods
- To regulate matters relating to “Halal Food”.
- To prepare periodic technical reports/gazette on situation of food safety in the province and perform any other function, if any, assigned to it by the respective Governments.



15. INTERNATIONAL CERTIFICATIONS & LOCAL STANDARDS

Several food standards and laws are prevailing in different regions of the world. Many organizations have their own set of standards that becomes obligatory for the suppliers to follow. Similarly different countries have enforced their set of laws/ standards and every food product entering their border needs to fulfill those laws.

15.1 International Food Standards

The internationally recognized food standards pertaining to food safety system in the industry are:

- Codex Alimentarius Commission (CAC)
- International Organization for Standardization (ISO)
- International Food Standard (IFS)
- British Retail Consortium Global Standard – Food

Codex Alimentarius Commission (CAC)

The Codex Alimentarius (Latin for "Food Code") is a collection of internationally recognized standards, codes of practice, guidelines, and other recommendations relating to foods, food production, and food safety.

Its name is derived from the Codex Alimentarius Austriacus. Its texts are developed and maintained by the Codex Alimentarius Commission, a body that was established in early November 1961 by the Food and Agriculture Organization of the United Nations (FAO), was joined by the World Health Organization (WHO) in June 1962, and held its first session in Rome in October 1963.⁵⁸ The Commission's main goals are to protect the health of consumers and ensure fair practices in the international food trade. The Codex Alimentarius is recognized by the World Trade Organization as an international reference point for the resolution of disputes concerning food safety and consumer protection.⁵⁹ As of 2017, currently the Codex Alimentarius Commission has:

188 Codex Members - 187 Member Countries and 1 Member Organization (EU) 219 Codex Observers - 56 IGOs, 147 NGOs, 16 UN.

The Codex Alimentarius covers all foods, whether processed, semi-processed or raw. In addition to standards for specific foods, the Codex Alimentarius contains general standards covering matters such as food labeling, food hygiene, food additives and pesticide residues,

⁵⁸ Codex timeline from 1945 to the present

⁵⁹ *Understanding the Codex Alimentarius Preface*. Third Edition. Published in 2006 by the World Health Organization and the Food and Agriculture Organization of the United Nations. Accessed 3 September 2008.

and procedures for assessing the safety of foods derived from modern biotechnology. It also contains guidelines for the management of official i.e. governmental import and export inspection and certification systems for foods.

The Codex Alimentarius is published in the six official languages of the United Nations: Arabic, Chinese, English, French, Spanish and Russian.

Specific standards covers:

- Meat products (fresh, frozen, processed meats and poultry)
- Fish and fishery products (marine, fresh water and aquaculture)
- Milk and milk products
- Foods for special dietary uses (including infant formula and baby foods)
- Fresh and processed vegetables, fruits, and fruit juices
- Cereals and derived products, dried legumes
- Fats, oils and derived products such as margarine
- Miscellaneous food products (chocolate, sugar, honey, mineral water)

International Organization For Standardization (ISO)

Founded on 23 February 1947, the organization promotes worldwide proprietary, industrial and commercial standards. It is headquartered in Geneva, Switzerland, and as of March 2017 works in 162 countries. It was one of the first organizations granted general consultative status with the United Nations Economic and Social Council. It is a non-governmental organization – a federation of national standards bodies from all regions of the world, one per country, including developed, developing and transitional economies. Each ISO member is the principal standards organization in its country. The members propose new standards, participate in their development and provide support in collaboration with ISO Central Secretariat for the 3000 technical groups that actually develop the standards.

The International Food Standard, often short IFS or also IFS Food, is a standard in the field of food safety drafted by HDE, the German trade association of distributors of food. The standard is also known as International Featured Standard – Food.⁶⁰

The French retail trade association FCD has joined the IFS standard, while the Italian organizations ANCC, ANCD and Federdistribuzione support the standard. This, plus the fact that the IFS standard was developed based on the BRC Global Standard for Food Safety , means that the standard is also known as the German-French equivalent of BRC Food.

⁶⁰ Bureau Veritas Netherlands: IFS Food. Accessed on September 13 2010.

Within IFS is working with four so-called "knock-out criteria". If it does not meet one of these criteria, the supplier is not automatically certified. These criteria are:

- Control of critical control points
- Involvement of management and employees
- Traceability of products , raw materials and packaging materials
- Implementation of corrective actions

An important difference between BRC Food is that there is a possibility at BRC for up to 28 days after an audit to provide evidence that it is given sufficient substance to the shortcoming. IFS within this emphatically is not possible: the result of the audit is the outcome of the review. The frequency of the audits is determined in both systems by the result obtained, and the risk-class of the product.⁶¹

British Retail Consortium (BRC)

The British Retail Consortium was formed in January 1992 when the British Retailers' Association and the Retail Consortium merged. In 1998 it produced the first edition of the BRC Food Technical Standard and Protocol for food suppliers. This has been widely adopted not just throughout the UK but around the world.

It campaigns for the retail industry and is the authoritative voice of retail, recognized for its powerful campaigning and influence within government and as a provider of in-depth retail information. The BRC leads the industry and works with their members to tell the story of retail, shape debates and influence issues and opportunities which will help make that positive difference.

15.2 International Certifications

The food sector has seen increasing demands on quality and guarantees of quality in the past few years. This lead to the development of numerous quality systems, standards and norms. There is no globally harmonized system, at least not till present, but instead many initiatives have been developed to include similar yet slightly different criteria on how to guarantee food safety

Following are some major certifications:

- HACCP
- Food Safety Management Systems ISO 22000:500
- FSSC 2000
- ISO 9001:2015
- IFS

⁶¹ T Service: Standards - IFS. Accessed on September 13 2010.

- BRC
- SQF
- GlobalG.A.P
- Organic Food Certification
- Halal Certification
- OHSAS 18001
- SA 8000
- GMP+
- ISO 17799 - BS7799 - ISO 27001

a) Hazard Analysis & Critical Control Points (HACCP)

HACCP is a systematic preventive approach to food safety from biological, chemical, and physical hazards in production processes that can cause the finished product to be unsafe, and designs measurements to reduce these risks to a safe level. In this manner, HACCP attempts to avoid hazards rather than attempting to inspect finished products for the effects of those hazards. The HACCP system can be used at all stages of a food chain, from food production and preparation processes including packaging, distribution, etc. The Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) require mandatory HACCP programs for juice and meat as an effective approach to food safety and protecting public health. Meat HACCP systems are regulated by the USDA, while seafood and juice are regulated by the FDA. All other food companies in the United States that are required to register with the FDA under the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, as well as firms outside the US that export food to the US, are transitioning to mandatory Hazard Analysis and Risk-based Preventive Controls (HARPC) plans.

Principles

HACCP expanded in all realms of the food industry, going into meat, poultry, seafood, dairy, and has spread now from the farm to the fork is based on following 7 point principle:⁶²

i. Conduct a Hazard Analysis

Plans determine the food safety hazards and identify the preventive measures the plan can apply to control these hazards. A food safety hazard is any biological, chemical, or physical property that may cause a food to be unsafe for human consumption.

⁶² ISO 22000 FSMS 2005

ii. Identify Critical Control Points

A critical control point (CCP) is a point, step, or procedure in a food manufacturing process at which control can be applied and, as a result, a food safety hazard can be prevented, eliminated, or reduced to an acceptable level.

iii. Establish Critical Limits for Each Critical Control Point

A critical limit is the maximum or minimum value to which a physical, biological, or chemical hazard must be controlled at a critical control point to prevent, eliminate, or reduce that hazard to an acceptable level.

iv. Establish Critical Control Point Monitoring Requirements

Monitoring activities are necessary to ensure that the process is under control at each critical control point. In the United States, the FSIS requires that each monitoring procedure and its frequency be listed in the HACCP plan.

v. Establish Corrective Actions

These are actions to be taken when monitoring indicates a deviation from an established critical limit. The final rule requires a plant's HACCP plan to identify the corrective actions to be taken if a critical limit is not met. Corrective actions are intended to ensure that no product is injurious to health or otherwise adulterated as a result if the deviation enters commerce.

vi. Establish Procedures For Ensuring The Haccp System Is Working as Intended

Validation ensures that the plants do what they were designed to do; that is, they are successful in ensuring the production of a safe product. Plants will be required to validate their own HACCP plans. FSIS will not approve HACCP plans in advance, but will review them for conformance with the final rule.

Verification ensures the HACCP plan is adequate, that is, working as intended. Verification procedures may include such activities as review of HACCP plans, CCP records, critical limits and microbial sampling and analysis. FSIS is requiring that the HACCP plan include verification tasks to be performed by plant personnel. Verification tasks would also be performed by FSIS inspectors. Both FSIS and industry will undertake microbial testing as one of several verification activities.

Verification also includes 'validation' – the process of finding evidence for the accuracy of the HACCP system (e.g. scientific evidence for critical limitations).

vii. Establish Record Keeping Procedures

The HACCP regulation requires that all plants maintain certain documents, including its hazard analysis and written HACCP plan, and records documenting the monitoring of critical



control points, critical limits, verification activities, and the handling of processing deviations. Implementation involves monitoring, verifying, and validating of the daily work that is compliant with regulatory requirements in all stages all the time. The differences among those three types of work are given by Saskatchewan Agriculture and Food.

Benefits to the Business

HACCP based procedures provide businesses with a cost effective system for control of food safety, from ingredients right through to production, storage and distribution to sale and service of the final consumer. The preventive approach of HACCP based procedures not only improves food safety management but also complements other quality management systems. The main benefits of HACCP based procedures are:

- Saves business money in the long run
- Avoids poisoning to customers
- Food safety standards increase
- Food quality standards increase
- Organizes process to produce safe food
- Organizes your staff promoting teamwork and efficiency
- Due diligence defense in court.

b) Food Safety Management Systems (FSMS) ISO 2200:500

ISO 22000 is a Food Safety Management System that can be applied to any organization in the food chain, farm to fork. Becoming certified to ISO 22000 allows a company to show their customers that they have a food safety management system in place. This provides customer confidence in the product. This is becoming more and more important as customers demand safe food and food processors require that ingredients obtained from their suppliers to be safe.

The International Organization for Standardization (ISO) developed the Food Safety Management System Certification: ISO 22000. ISO and its member countries used the Quality Management System approach, and tailored it to apply to Food Safety, incorporating the widely used and proven HACCP principles and Good Manufacturing Principles (addressed by Prerequisite Programs in ISO 22000).

Requirements

ISO 22000 requires to build a Food Safety Management System. This means that there will be a documented system in place and fully implemented throughout the facility that includes:⁶³

- Effective Prerequisite Programs in place to ensure a clean sanitary environment.

⁶³ 22000-Tools.com, by Vinca, LLC.

- A Hazard Analysis and Critical Control Plan developed to identify, prevent and eliminate food safety hazards.
- Established documented food safety management system processes to manage food safety throughout your organization - from management and business planning aspects to day to day communication and operations affecting food safety.

The ISO 22000 standard contains the specific requirements to be addressed by the Food Safety Management System. The standard requires food safety management system processes including:

- Having an overall Food Safety Policy for your organization, developed by top management.
- Setting objectives that will drive your company's efforts to comply with this policy.
- Planning and designing a management system and documenting the system.
- Maintaining records of the performance of the system.
- Establishing a group of qualified individuals to make up a Food Safety Team.
- Defining communication procedures to ensure effective communication with important contacts outside the company (regulatory, customers, suppliers and others) and for effective internal communication.
- Having an emergency plan.
- Holding management review meetings to evaluate the performance of the FSMS.
- Providing adequate resources for the effective operation of the FSMS including appropriately trained and qualified personnel, sufficient infrastructure and appropriate work environment to ensure food safety.
- Implementing Prerequisite Programs.
- Following HACCP principles.
- Establishing a traceability system for identification of product.
- Establishing a corrective action system and control of nonconforming product.
- Maintaining a documented procedure for handling withdrawal of product.
- Controlling monitoring and measuring devices.
- Establishing and maintaining an internal audit program.
- Continually updating and improving the FSMS.

Benefits to the Business

- Allows organization within the food chain to demonstrate their commitment to food safety.
- Improved internal and external communication.
- Ability to show control of known food hazards.



- An internationally accepted standard for export sales.
- A cost effective way of reducing wastage and recalls.
- Expanded market access
- Continuous improvement of an organization's food safety management system.
- Use of the internationally recognized NSF certification mark.
- Enables an organization to align its food safety management system with other recognized management systems such as quality (ISO 9001) and environmental (ISO 14001).

c) Food Safety System Certification (FSSC) 2000

FSSC 22000 contains a complete certification Scheme for Food Safety Management Systems based on existing standards for certification (ISO 22000, ISO 22003 and technical specifications for sector PRPs). Certification needs accreditation under the standard ISO guide 17021. Manufacturers that are already certified against ISO 22000 will only need an additional review against technical specifications for sector PRPs to meet FSSC 22000.

FSSC 22000 was developed for the certification of food safety systems of organizations in the food chain that process or manufacture animal products, perishable vegetal products, products with a long shelf life, (other) food ingredients like additives, vitamins, bio-cultures and food packaging material manufacturing.

Design

The FSSC 22000 Scheme sets out the requirements for Certification Bodies (CBs) to develop, implement and operate a certification scheme and to guarantee its impartiality and competence. The Scheme sets out the requirements to assess the food safety system of food manufacturing organizations and to issue a certificate. This certificate indicates that the organizations food safety system is in conformance with the requirements which are given in the Scheme and that the organization is able to maintain conformance with these requirements. The value added to an organization with a certified food safety system lies in the efforts made by the organization to maintain that system and its commitment to continuously improve its performance.

Scope

The Scheme provides a certification model that can be used in the whole food supply chain. It can cover sectors where such a technical specification for sector PRPs has been realized. FSSC 22000 follows the food chain category description as defined in ISO/TS 22003. As the

development of new technical specifications for sector PRPs is ongoing, the actual scope of the Scheme will follow these developments.⁶⁴

Table: Scope of FSSC 2000

| Scope | Category |
|--|---|
| Food Manufacturing ISO/TS 22002-1 | CI. Processing of perishable animal products |
| | CII. Processing of perishable plant products |
| | CIII. Processing of perishable plants and animals products (mixed products) |
| | CIV. Processing of ambient stable products |
| | DII. production of pet food for dogs and cats |
| | K. Production of (bio)chemicals |
| Packaging ISO/TS 22002-4 | I. Production of Food packaging & packaging material |
| Feed Manufacturing PAS 222 | DI. Production of animal feed |
| | DII. Production of pet food |
| Farming ISO/TS 22002-3 | AI. Farming of animals for meat/milk/eggs/honey |
| | ALL. Farming of fish and seafood |

Source: <http://www.fssc22000.com>

Requirements & Regulations

The scheme specifies detailed requirements for:⁶⁵

- Food safety system of the food organizations to be certified,
- Certification system of the CBs,
- System of accreditation by the accreditation bodies (ABs).

Furthermore it contains regulations for:

- CBs which are licensed by the Foundation to provide certification on the basis of this scheme
- Harmonization process in which the licensed CBs participate to align audit and certification issues
- Accreditation bodies which accredit the licensed CBs

⁶⁴ <http://www.fssc22000.com/documents/standards/scope.xml?lang=en>

⁶⁵ <http://www.fssc22000.com/documents/standards/requirements-regulations.xml?lang=en>

- Board, which is the central Board of Stakeholders and experts of the CBs

Benefits to the Business

FSSC 22000 Is an ISO based Food Safety Management System and it integrates nicely with other ISO based management systems including ISO 9001, ISO 14000 and others.⁶⁶

- Managing Risk

First and foremost, building an FSSC System will provide your company with effective management of food safety hazards by creating an environment capable of producing safe product and a management system to continually manage, monitor, validate and improve the system.

- Maintain current customers

Statistics show that approximately 1 out of 4 certified companies are asking their suppliers to achieve certification. Chances are that if you have not been asked yet, you will be asked in the near future. Starting on your certification can help you stay competitive and qualified to work with your current customers.

- Increases market reach

Large retailers and multinational manufacturers or processors are also demanding certification of their suppliers. Having FSSC Certification means you are qualified to supply these organizations or their suppliers, opening up a large market for your products.

- Prepare for upcoming regulatory changes

Countries across the globe are making changes to food safety regulations, including the United States and its Food Safety Modernization Act (FSMA). FSSC prepares your organization to meet many or most of the FSMA requirements.

Becoming certified to FSSC can increase your market opportunities, increase your customer's confidence in your food safety practices and improve your internal processes to ensure safe product.

d) Quality Management System (QMS) ISO 9001:20015

ISO 9001 is a standard that sets out the requirements for a quality management system. It helps businesses and organizations to be more efficient and improve customer satisfaction. ISO 9001 builds on seven quality management principles. Following these principles will ensure the organization or business is set up to consistently create value for its customers.

⁶⁶ Food Safety. Training & Tools. <http://www.22000-tools.com/benefits-of-fssc.html>

With these seven pillars firmly in place, implementing a quality management system will be much easier.

Principles

The seven quality management principles are:⁶⁷

i. Customer Focus

Meeting and exceeding customer needs is the primary focus of quality management and contributes to the long-term success of any enterprise. It is important to not only attract but also retain the confidence of the customers, so adapting to their future needs is key.

ii. Leadership

Having a unified direction or mission that comes from strong leadership is essential to ensure that everyone in the organization understands what the management is trying to achieve.

iii. Engagement of People

Creating value for the customers will be easier if competent, empowered and engaged people are present at all levels of business or organization.

iv. Process Approach

Understanding activities as processes that link together and function as a system helps achieve more consistent and predictable results. People, teams and processes do not exist in a vacuum and ensuring everyone is familiar with the organization's activities and how they fit together will ultimately improve efficiency.

v. Improvement

Successful organizations have an ongoing focus on improvement. Reacting to changes in the internal and external environment is necessary to continue to deliver value for the customers. This is of paramount importance today when conditions evolve so quickly.

vi. Evidence-Based Decision Making

Making decisions is never easy and naturally involves a degree of uncertainty, but ensuring that decisions are based on the analysis and evaluation of data is more likely to produce the desired result.

vii. Relationship Management

Today's businesses and organizations do not work in a vacuum. Identifying the important relationships any organization have with interested parties such as suppliers – and setting out a plan to manage them – will drive sustained success.

⁶⁷ https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/iso_9001-2015_-_how_to_use_it.pdf

Benefits to the Business

Benefits to the organization:⁶⁸

- Provides senior management with an efficient management process
- Sets out areas of responsibility across the organization
- Mandatory if you want to tender for some public sector work
- Communicates a positive message to staff and customers
- Identifies and encourages more efficient and time saving processes
- Highlights deficiencies
- Reduces your costs
- Provides continuous assessment and improvement
- Marketing opportunities
- Meet the necessary statutory and regulatory requirements.

Benefits to the customers:⁶⁹

- Improved quality and service
- Delivery on time
- Right first time attitude
- Fewer returned products and complaints
- Independent audit demonstrates commitment to quality

e) International Food Standard (IFS)

In 2002, German food retailers developed a management system called International Food Safety, IFS, in order to create one common food safety standard. One year later, the German food retailers were joined by their French counterparts, who participated in the fourth version of the IFS. The appliance of IFS is discussed with wholesalers and retailers and their federations in Poland, Austria, Belgium, Netherlands, UK and Italy.

Criteria

Within IFS is working with four so-called “knock-out criteria”. If it does not meet one of these criteria, the supplier is not automatically certified. These criteria are:

- Control of critical control points
- Involvement of management and employees
- Traceability of products , raw materials and packaging materials
- Implementation of corrective actions.

⁶⁸ <http://www.iso9001.com/benefitsofiso9001.asp>

⁶⁹ <http://www.iso9001.com/benefitsofiso9001.asp>

The IFS Food version 6 are requirements in the area of food defense included. Companies have developed a food defense plan and implemented.

Benefits To The Business

IFS enables producers of any size to standardize their processes for safe manufacturing, thus making them easier, more efficient and cost-effective.⁷⁰ By successfully implementing IFS Standards, companies demonstrate to their customers not only that they can manufacture a safe product according to customer specifications, but they also save money. Benefits of IFS for manufacturers:

- Risk-based, non-prescriptive standards
- Action plans to improve performance
- A uniform system of quality assurance
- Fewer recalls
- Optimized processes
- Greater competitiveness
- Improved relations with customers and authorities, improved business opportunities
- International recognition
- Global network (data for own supplier and retailer search)

f) British Retail Consortium (BRC)

BRC Global Standard for Food Safety is developed by food industry experts from retailers, manufacturers and food service organizations to ensure it is a rigorous and detailed, yet easy to understand the BRC Global Standard. First published in 1998 it is now in its 7th issue and well established globally defined by many leading global specifiers.

It provides a framework to manage product safety, integrity, legality and quality, and the operational controls for these criteria, in the food and food ingredient manufacturing, processing and packing industry.⁷¹

SCOPE

The BRC Global Standard focuses on:

- The importance of management commitment
- HACCP (Hazard Analysis and Critical Control Point) based food safety programs
- Quality management systems
- Auditing good manufacturing processes – it is not just a paperwork audit

⁷⁰ <https://www.ifs-certification.com/index.php/en/industry-en/benefits-of-an-ifs-certification-en>

⁷¹ <https://www.brcglobalstandards.com/brc-global-standards/food-safety/>

- Auditing areas which often have the highest rate of product recalls and withdrawals, such as labelling and packing
- Developing systems to reduce exposure to food fraud
- Ensuring consistency of the audit process
- Providing a BRC Global Standard that is portable enough to allow Additional Modules to be added to reduce audit burden
- Promoting greater resilience, transparency and traceability in the supply chain

The BRC Global Standard is divided into seven sections:

1. Senior Management Commitment and Continual Improvement

Consistent food safety is the responsibility of everyone within the company, however, the starting point for an effective food safety plan is the commitment of senior management to the implementation of the BRC Global Standard and continual development. This includes providing adequate resources, effective communication, system reviews, actions taken and opportunities for improvement.

2. The Food Safety Plan (HACCP)

The BRC Global Standard requires the development of an effective HACCP (Hazard Analysis and Critical Control Point) program based on the requirements of the internationally recognized Codex Alimentarius system.

3. Food Safety and Quality Management System

This section sets out the requirements for the management of food safety and quality. This includes requirements for product specifications, supplier approval, traceability, and the management of incidents and product recalls.

4. Site Standards

This section sets out expectations for the production environment including the layout and maintenance of the buildings and equipment, cleaning, pest control, waste management and foreign body controls.

5. Product Control

The requirements for product design and development stage including allergen management, product and ingredient provenance, product packaging and product inspection and testing.

6. Process Control

The establishment and maintenance of safe process controls, weight/volume control and equipment calibration, and ensures the documented HACCP plan is put into practice.

7. Personnel



This section sets out the standards needed for staff training, protective clothing and personal hygiene.

Benefits to the Business

The BRC Global Standard for Food Certification aims to:⁷²

- Promote best practices
- Improve supplier standards and consistency, and avoid product failure
- Eliminate multiple audits of food manufacturers
- Support retailer objectives at all levels of the manufacturing supply chain
- Provide concise information to assist with due diligence defense.

g) Safe Quality Food (SQF)

The Safe Quality Food (SQF) Program is a global food safety and quality certification program, designed to meet the needs of retailers and foodservice providers around the world who require HACCP and ISO based food safety and quality management systems from their suppliers. It offers independent certification to ensure that a supplier's food safety and quality management system complies with international and domestic food safety regulations. The SQF Code Edition 7, a process and product certification standard, has been redesigned for use by all sectors of the food industry from primary production to transport and distribution. It is a Hazard Analysis Critical Control Points (HACCP) - based food safety and quality management system that utilizes the US National Advisory Committee on Microbiological Criteria for Food (NACMCF) and the CODEX Alimentarius Commission HACCP principles and guidelines. The SQF Code Level 2 has been re-benchmarked by Global Food Safety Initiative (GFSI) and has achieved recognition against the GFSI Guidance Document Sixth Edition.⁷³

Systems

According to the SQF, it would be complicated to develop one management system for a sector that is as diverse as the food sector. Hence, there are two standards that can be applied:

- **SQF 1000** is a management system for low-risk companies in the primary agricultural sector and small scale processors on the food chain.

⁷² <https://www.cert-id.com/Certification-Programs/BRC-Certification/Benefits-of-BRC-Certification.aspx>

⁷³ International Trade Centre. Safe Quality Food Program. www.sqfi.com

- **SQF 2000** is mainly applied in high⁷⁴-risk companies, companies that are medium or big sized.

Levels

There are three levels of SQF which include:

1. SQF Level 1 - Focuses on food safety fundamentals, this is the most basic level with the fewest requirements. It is most appropriate for low risk operations and does not include a HACCP approach. This level is not recognized by GFSI.
2. SQF Level 2- This level includes food safety fundamentals and a HACCP approach to managing risks and hazards. This level is comparable to the ISO 22000, FSSC 22000 and BRC standards and registration schemes. This level is recognized by GFSI.
3. SQF Level 3- The level 3 requirements include quality requirements in addition to the food safety requirements and is appropriate for the organization that wants to have an integrated system for food safety and food quality. This would be similar to having an ISO 22000 system integrated with an ISO 9001 system.

Benefits to the Business

An SQF certification:⁷⁵

- Reduces or eliminates the need for multiple, redundant audits
- Protects brand integrity
- Assures customers and buyers that the certificate holder has achieved a high degree of competence in critical areas and is continually monitoring and improving product quality, safety and legality
- Offers complete “farm to fork” supply chain management from primary production to manufacturing to distribution
- Provides for every type of product and process to be evaluated and the certification that results is internationally recognized.

h) GLOBALG.A.P

GLOBALG.A.P. is a farm assurance program, translating consumer requirements into Good Agricultural Practice. EuroGAP is a common standard for farm management practice created in the late 1990s by several European supermarket chains and their major suppliers. GAP is an acronym for Good Agricultural Practices. The aim was to bring conformity to different

⁷⁴ <http://www.22000-tools.com/sqf-levels.html>

⁷⁵ <http://www.foodmanufacturing.com/blog/2016/04/whats-involved-safe-quality-food-sqf-certification>

retailers' supplier standards, which had been creating problems for farmers. It is now the world's most widely implemented farm certification scheme. Most European customers for agricultural products now demand evidence of EuroGAP certification as a prerequisite for doing business.

The standard was developed using the Hazard Analysis and Critical Control Points (HACCP) guidelines published by the United Nations Food and Agriculture Organization, and is governed according to the ISO Guide 65 for certifications schemes. Unlike other farm certification schemes, it has definitive rules for growers to follow, and each production unit is assessed by independent third party auditors. These auditors work for commercial certification companies who are licensed by the EuroGAP secretariat to conduct audits and award certificates where merited.

In September 2007, EuroGAP changed its name to GLOBALG.A.P. The decision was taken to reflect its expanding international role in establishing Good Agricultural Practices between multiple retailers and their suppliers.⁷⁶

In February 2009 GLOBALG.A.P. Launched 'ChinaGAP' following successful completion of the benchmarking of ChinaGAP against the GLOBALG.A.P. Good Agricultural Practice reference code.⁷⁷

Products & Scope

GlobalG.A.P offers 3 main certification products:

- localg.a.p
- GLOBAL.G.A.P
- GLOBALG.A.P.+ Add-on
- GLOBALG.A.P. offers 16 standards for 3 scopes: Crops, Livestock, and Aquaculture
- localg.a.p. and GLOBALG.A.P.+ Add-on offer programs for developing customized solutions for the food industries

The Standard provides a holistic approach to producing crops, livestock and aquaculture that covers food safety, traceability, environmental sustainability, worker health and safety, and animal welfare. The scopes (e.g. crops) are automatically coupled to the sub-scopes that a producer or producer group applies for. For example, a strawberry grower must comply with the All Farm Base, the Crops Standard, and the Fruit & Vegetables CPCC to receive a GLOBALG.A.P. Fruit & Vegetables Standard Certificate.

⁷⁶ GLOBALGAP. "Integrated Farm Assurance Standards". Archived from the original on 2 October 2011. Retrieved 4 April 2009.

⁷⁷ ChinaGAP. "China Ready for Good Agricultural Practice Certification". Archived from the original on 2 October 2011. Retrieved 25 June 2011.



Table: Structure of GLOBAL.G.A.P

| | | | |
|------------------|-----------------------------|--------------------------|---------------------|
| AF All Farm Base | Plant Propagation Material | | |
| | CB Crops Base | FV Fruit & Vegetable | |
| | | CC Combinable Crops | |
| | | CO Coffee | |
| | | TE Tea | |
| | | FO Flowers & Ornamentals | |
| | LB Livestock Base | RB Ruminant base | DY Dairy |
| | | | CS Cattle & Sheep |
| | | | CYB Calf/Young Beef |
| | | PG Pigs | |
| | | PY Poultry | |
| | | TY Turkey | |
| | AB Aquaculture Module | | |
| | Compound Feed Manufacturing | | |

Source: www.globalgap.org

Benefits to the Business

By adopting the GLOBALG.A.P following benefits can be achieved:^{78, 79}

- Reduction of exposure to food safety risks.
- Improves traceability and reassure buyers using LGN, unique 13-digit localg.a.p. Number that identifies in the GLOBALG.A.P. Database.
- Access local and regional markets through a local program based on the globally recognized GLOBALG.A.P. Certification System.
- Improve the efficiency of farm management.
- Comply with legislation on food safety and proper hygiene.
- All relevant documents are accessible online, free of charge.

i) Organic Food Certification

Organic certification is a certification process for producers of organic food and other organic agricultural products. In general, any business directly involved in food production can be certified, including seed suppliers, farmers, food processors, retailers and restaurants. A

⁷⁸ <http://www.globalgap.org/>

⁷⁹ http://www.logistyka.net.pl/bank-wiedzy/logistyka/item/download/78920_aa156d9fee7312c62a2a5d3745213d6c

lesser known counterpart is certification for organic textiles (or Organic clothing) that includes certification of textile products made from organically grown fibers.

In some countries, certification is overseen by the government, and commercial use of the term organic is legally restricted. Certified organic producers are also subject to the same agricultural, food safety and other government regulations that apply to non-certified producers.

Certified organic foods are not necessarily pesticide-free, certain pesticides are allowed.

Requirements

Requirements vary from country to country (List of countries with organic agriculture regulation), and generally involve a set of production standards for growing, storage, processing, packaging and shipping that include:

- avoidance of synthetic chemical inputs (e.g. fertilizer, pesticides, antibiotics, food additives), irradiation, and the use of sewage sludge⁸⁰
- avoidance of genetically modified seed
- use of farmland that has been free from prohibited chemical inputs for a number of years (often, three or more)
- for livestock, adhering to specific requirements for feed, housing, and breeding;
- keeping detailed written production and sales records (audit trail)
- maintaining strict physical separation of organic products from non-certified products;
- undergoing periodic on-site inspections.

Purpose

Organic certification addresses a growing worldwide demand for organic food. It is intended to assure quality and prevent fraud, and to promote commerce. While such certification was not necessary in the early days of the organic movement, when small farmers would sell their produce directly at farmers' markets, as organics have grown in popularity, more and more consumers are purchasing organic food through traditional channels, such as supermarkets. As such, consumers must rely on third-party regulatory certification.

For organic producers, certification identifies suppliers of products approved for use in certified operations. For consumers, "certified organic" serves as a product assurance, similar to "low fat", "100% whole wheat", or "no artificial preservatives".

⁸⁰ "EPA Definition of certified organic"

Certification is essentially aimed at regulating and facilitating the sale of organic products to consumers. Individual certification bodies have their own service marks, which can act as branding to consumers—a certifier may promote the high consumer recognition value of its logo as a marketing advantage to producers.

Methodology

To certify a farm, the farmer is typically required to engage in a number of new activities, in addition to normal farming operations:

- Study the organic standards, which cover in specific detail what is and is not allowed for every aspect of farming, including storage, transport and sale.
- Compliance — farm facilities and production methods must comply with the standards, which may involve modifying facilities, sourcing and changing suppliers, etc.
- Documentation — extensive paperwork is required, detailing farm history and current set-up, and usually including results of soil and water tests.
- Planning — a written annual production plan must be submitted, detailing everything from seed to sale: seed sources, field and crop locations, fertilization and pest control activities, harvest methods, storage locations, etc.
- Inspection — annual on-farm inspections are required, with a physical tour, examination of records, and an oral interview.
- Fee — an annual inspection/certification fee (currently starting at \$400–\$2,000/year, in the US and Canada, depending on the agency and the size of the operation). There are financial assistance programs for qualifying certified operations.
- Record-keeping — written, day-to-day farming and marketing records, covering all activities, must be available for inspection at any time.

In addition, short-notice or surprise inspections can be made, and specific tests (e.g. soil, water, plant tissue) may be requested. For first-time farm certification, the soil must meet basic requirements of being free from use of prohibited substances (synthetic chemicals, etc.) for a number of years. A conventional farm must adhere to organic standards for this period, often two to three years. This is known as being in transition. Transitional crops are not considered fully organic.

Certification for operations other than farms follows a similar process. The focus is on the quality of ingredients and other inputs, and processing and handling conditions. A transport company would be required to detail the use and maintenance of its vehicles, storage facilities, containers, and so forth. A restaurant would have its premises inspected and its suppliers verified as certified organic.

Benefits to the Business

Becoming certified organic helps producers and handlers:⁸¹

- Receive premium prices for their products
- Access fast-growing local, regional, and international markets
- Support local economies
- Access additional funding and technical assistance
- Market products to consumers

Research shows that organic farming practices can:

- Improve water quality
- Conserve energy
- Increase biodiversity
- Contribute to soil health

j) Halal Food Certification

Halal, also spelled hallal or halaal, is any object or action which is permissible to use or engage in, according to Islamic law. The term covers and designates food and drink as well as matters of daily life.⁸² It is one of five Ahkam—fard (compulsory), mustahabb (recommended), halal (allowed), makruh (disliked), haram (forbidden)—that define the morality of human action in Islam.⁸³ Mubah is also used to mean "permissible" or "allowed" in Islam.

The Dubai Chamber of Commerce estimated the global industry value of halal food consumer purchases to be US\$1.1 trillion in 2013, accounting for 16.6 percent of the global food and beverage market, with an annual growth of 6.9 percent.⁸⁴ Growth regions include Indonesia (\$197 million market value in 2012) and Turkey (\$100 million). The European Union market for halal food has an estimated annual growth of around 15 percent and is worth an estimated US\$30 billion.⁸⁵

⁸¹ United States Department of Agriculture. Agricultural Marketing Services. <https://www.ams.usda.gov/services/organic-certification/benefits>

⁸² Quran 7:157

⁸³ Adamec, Ludwig (2009). *Historical Dictionary of Islam*, 2nd Edition. Lanham: Scarecrow Press, Inc. p. 102. ISBN 978-0-8108-6161-9.

⁸⁴ www.zawya.com. Retrieved 2016-08-31.

⁸⁵ "USDA Foreign Agricultural Service – Halal Food Market" (PDF). Retrieved Aug 30, 2016.



Lawful Food

The term halal may be used for foods which are considered lawful. Under the Islamic Law, all sources of food are lawful except the following sources, including their products and derivatives which are considered unlawful:⁸⁶

1. Food of Animal Origin

- Pigs and boars.
- Dogs, snakes and monkeys.
- Carnivorous animals with claws and fangs such as lions, tigers, bears and other similar animals.
- Birds of prey with claws such as eagles, vultures, and other similar birds.
- Pests such as rats, centipedes, scorpions and other similar animals.
- Animals forbidden to be killed in Islam i.e., ants, bees and woodpecker birds.
- Animals which are considered repulsive generally like lice, flies, maggots and other similar animals.
- Animals that live both on land and in water such as frogs, crocodiles and other similar animals.
- Mules and domestic donkeys.
- All poisonous and hazardous aquatic animals.
- Any other animals not slaughtered according to Islamic Law.
- Blood.

2. Food of Plant Origin

- Intoxicating and hazardous plants except where the toxin or hazard can be eliminated during processing.

3. Drinks & Beverages

- Alcoholic drinks.
- All forms of intoxicating and hazardous drinks

4. Food Additives

- All food additives derived from above mentioned all Items.

Slaughtering

All lawful land animals should be slaughtered in compliance with the rules laid down in the Codex Recommended Code of Hygienic Practice for Fresh Meat and the following requirements:⁸⁷

⁸⁶ <http://www.fao.org/docrep/005/Y2770E/y2770e08.htm>

- The person should be a Muslim who is mentally sound and knowledgeable of the Islamic slaughtering procedures.
- The animal to be slaughtered should be lawful according to Islamic law.
- The animal to be slaughtered should be alive or deemed to be alive at the time of slaughtering.
- The phrase “Bismillah” (In the Name of Allah) should be invoked immediately before the slaughter of each animal.
- The slaughtering device should be sharp and should not be lifted off the animal during the slaughter act.
- The slaughter act should sever the trachea, esophagus and main arteries and veins of the neck region.

Preparation, Processing, Packaging, Transportation & Storage

All food should be prepared, processed, packaged, transported and stored in such a manner that it complies with above sections and definitions and the Codex General Principles on Food Hygiene and other relevant Codex Standards.

Additional Labelling Requirements

- When a claim is made that a food is halal, the word halal or equivalent terms should appear on the label.
- In accordance with the Codex General Guidelines on Claims, claims on halal should not be used in ways which could give rise to doubt about the safety of similar food or claims that halal foods are nutritionally superior to, or healthier than, other foods.

Benefits to the Business

Listed below are the benefits of being Halal certified:

- As a confirmation for Muslim customers that the food served is Halal and is in accordance with Islamic Law.
- Assure customers that the food served is Halal and healthy and the premise's hygiene and sanitation procedures are in top-notch.
- Widen the range of customers by attracting Muslim customers and non-Muslim who are Halal consumers.
- Increase a restaurant's revenue and enhance its marketability especially to Halal consumers.

⁸⁷ <http://www.fao.org/docrep/005/Y2770E/y2770e08.htm>

- If planning to export, the Halal certificate will help to assure Halal consumers in importing countries.

k) OHSAS 18001

OHSAS 18001, Occupational Health and Safety Assessment Series, (officially BS OHSAS 18001) is an internationally applied British Standard for occupational health and safety management systems. It exists to help all kinds of organizations put in place demonstrably sound occupational health and safety performance. It is a widely recognized and popular occupational health and safety management system.

The OHSAS 18001 specification was updated in July 2007. Among other changes, the new specification was more closely aligned with the structures of ISO 9000 and ISO 14000 so that organizations could more easily adopt OHSAS 18001 alongside existing management systems. Additionally, the "health" component of "health and safety" was given greater emphasis.

Methodology & Requirements

Occupational health and safety management system (OHSMS) promotes a safe and healthy working environment by providing a framework that helps organizations to:

- Identify and control health and safety risks
- Reduce the potential for accidents
- Aid legal compliance
- Improve overall performance

The OHSAS 18000 standards provide organizations with the elements of an effective safety management system which can be integrated with other management systems and help organizations achieve better occupational health and safety performance and economic objectives.

BS OHSAS 18001 specifies requirements for an OH&S management system to help an organization develop and implement a policy and objectives, which take into account legal requirements and information about OH&S risks. It applies to all types and sizes of organizations and accommodates diverse geographical, cultural and social conditions.

BS OHSAS 18002 provides guidance for establishing, implementing or improving a management system which is based on OHSAS 18001 and demonstrating successful implementation of OHSAS 18001.

OHSAS 18001 can be aligned with existing ISO 9001 and ISO 14001 management systems. Historically many organizations start with the quality management system ISO 9001, then add the environment management requirements from ISO 14001. Many organizations now look at implementing all three standards at once which can minimize costs and disruption.



The standards can be integrated using a standard such as BSI's (British Standards Institution) PAS 99.

Benefits to the Business

Safety and as such addresses the organization's continual improvement that can be used to provide stakeholders and others with assurances of conformance with its stated Occupational Health & Safety policy.

- Improves safety culture
- Improves efficiency and consequently reduces accident and production time loss
- Increased control of hazards and the reduction of risks through the setting of objectives, targets and devolved responsibility
- Demonstrate legal compliance
- Increased reputation for safety and occupational health
- Reduces insurance premiums
- Is an integral part of a sustainability strategy
- Demonstrates commitment to the protection of staff, property and plant
- Encourage more effective internal and external communication
- Business to business contract winner

I) Social Accountability Certification (SA8000)

SA8000 certification is a management systems standard, modeled on ISO standards. The management systems criteria require that facilities seeking to gain and maintain certification must go beyond simple compliance to the standard, but also integrate it into their management systems and practices and demonstrate ongoing conformance with the standard. SA8000 is based on the principles of international human rights norms as described in International Labour Organization conventions, the United Nations Convention on the Rights of the Child and the Universal Declaration of Human Rights.⁸⁸ It measures the performance of companies in eight areas important to social accountability in the workplace: child labour, forced labour, health and safety, free association and collective bargaining, discrimination, disciplinary practices, working hours and compensation.

Benefits to the Business

Following benefits can be achieved by applying SA800:⁸⁹

- Proves your commitment to social accountability and to treating your employees ethically and in compliance with global standards.

⁸⁸ "SA 8000 | Systems & standards | Strategies & tools". *lisd.org*. Retrieved 2013-10-15.

⁸⁹ <http://www.sgs.com/en/health-safety/quality-health-safety-and-environment/sustainability/social-sustainability/sa-8000-certification-social-accountability>

- Improves the management and performance of your supply chain.
- Allows you to ensure compliance with global standards and reduce the risk of negligence, public exposure and possible litigation.
- Supports your corporate vision and build and reinforce the loyalty of your employees, customers and stakeholders.
- Enables you to demonstrate proper social accountability when bidding for international contracts or expanding locally to accommodate new business.

m) GMP + Feed Safety Assurance

GMP+ Feed Safety Assurance is a complete module for the assurance of feed safety in all the links of the feed chain. Demonstrable assurance of feed safety is a 'license to sell' in many countries and markets and participation in the GMP+ FSA module can facilitate this excellently. Based on needs in practice, multiple components have been integrated into the GMP+ FSA module, such as requirements for the quality management system (ISO 9001), HACCP, product standards, traceability, monitoring, prerequisites programs, chain approach and the Early Warning System.

Scope

This standard contains the conditions and requirements for the feed safety assurance of industrially-produced feed ingredients, including their storage, trading (sale) and any transport of the feed ingredients produced. The requirements of this standard apply to organizations, irrespective of their type or size, which carry out activities which are covered within the scope of this standard. It is not important whether a company carries out these activities on its own account or as a (sub) contractor ('service provider').

Benefits to the Business

Companies benefit from GMP + certification, because it:⁹⁰

- Is focused on quality management (ISO 9001) and risk management (HACCP)
- Provides access to supporting information and services, such as risk assessments, fact sheets, storing and sharing your monitoring data, newsletters, Early Warning messages etc.)
- Offers new sales opportunities and to a great degree, ensures the retention of current customers.
- Guarantees the continuity of business operations, because the corporate structure is set up more efficiently and the costs and financial risks are limited.

⁹⁰ https://www.gmpplus.org/pagina/902/cert_feed_safety_assurance.aspx

- Helps improve the company image and the reliability.
- Makes your company part of a globally operating feed safety system (the GMP+ certificate is accepted internationally by about 12000 companies in 66 countries).
- Is accepted by other (inter)national schemes.
- Can easily be combined with multiple certifications (feed safety and sustainability).
- Contributes to uniformity in the feed chain.

n) ISO 17799 - BS7779 - ISO 27001

Initially developed from BS7799-1, ISO 17799 is an international standard that sets out the requirements of good practice for Information Security Management. ISO 27001 defines the specification for an Information Security Management System (ISMS). It was developed from BS 7799 Part 2:2002. The scope of any ISMS includes people, processes, IT systems and policies. This web site gives an overview of the stages involved and includes the changes made in ISO 27701 (based on the revised BS 7799 Part 2, issued in September 2002). The latest versions of BS7799 is BS7799-3, Guidelines for Information Security Risk Management. It support ISO 27001 and covers the main aspects for risk assessment.

As defined by ISO 17799, information security is characterized as the preservation of:⁹¹

- Confidentiality – ensuring that information is accessible only to those authorized to have access.
- Integrity – safeguarding the accuracy and completeness of information and processing methods.
- Availability – ensuring that authorized users have access to information and associated assets when required.

As a standard that is primarily conceptual, ISO 17799 is not:

- A technical standard
- Product or technology driven
- An equipment evaluation methodology such as the Common Criteria/ISO 15408 (www.commoncriteria.org), which deals with functional and assurance requirements of specific equipment.

Benefits to the Business

Organization can protect itself from potential system failure or misuse by investing in an independent audit of information security management system. The BS 7799 standard, involves a thorough review of all aspects of IT security. From data loss, unauthorized access

⁹¹ http://www.kwesthuba.co.za/downloads/03_ins_info_security_iso_17799_1101.pdf

and virus attack to electronic commerce, hacking and disaster recovery. The BS 7799 initiative carefully assesses the risks to your business and highlights the areas where improvements need to be made. BS7799 sets a new standard for handling of sensitive information. An information security management system has three main components:

- Confidentiality – Protects key information from unauthorized disclosure.
- Integrity – Safeguarding the accuracy and completeness of information and software
- Availability – Ensuring that information and services are available when required

A Certificate tells your existing and potential customers you have defined processes in operation. The certification process helps you to focus on continuous improvement of your information security thus enabling greater information exchanges with your key partners and clients.

15.3 Major Accredited Bodies in Pakistan

Here is a list of major accredited bodies working in Pakistan:

- Bureau Veritas Certification (BV Certification). H. No. 177, Block 7/8, Karachi Memon Cooperative Housing Society, PECHS, Karachi, Pakistan. Tel #: +92-21-111786-013, Fax #: +92-21-5876765, 4392713. Accreditation Scope (ISO/IEC 17021:2006)
- SGS Pakistan (Pvt.) Limited, Systems & Services Certification. H-3/3, Sector 5, Korangi Industrial Area, Karachi, Pakistan. Tel #: +92-21- 5121386-95, Fax #: +92-21- 5121328. Accreditation Scope (ISO/IEC 17021:2006)
- Moody International (Pvt.) Limited. 4 H-Annexe, Gulberg II, Lahore, Pakistan. Tel #: +92-42-5872172-77, Fax#: +92-42-5872179-80. Accreditation Scope (ISO/IEC 17021:2006)
- Pakistan Systems Registrar. 119/II, Popular Avenue, Phase-VI, Defense Housing Authority. Karachi-75500, Pakistan. Tel #: +92-21-5801372-3, 5886024. Accreditation Scope (ISO/IEC Guide 62 & 66)
- Resource Inspections Canada Incorporated. 31-B-3, Ali Zeb Road, Gulberg III, Lahore, Pakistan. Tel #: +92-42-35777630-31 / +92-42-36400762 / +92-300-4330853.

15.4 List Of Accredited Labs of Pakistan

- National Physical and Standards Laboratory (NPSL),
- Qarshi Research International (Pvt.) Limited, Hattar
- Leather Research Centre(LRC), PCSIR, Karachi
- SGS Pakistan Textile Laboratory, Karachi
- Metrological Centre, F6 Rebuild Factory, Kamra
- Explosives (Chemical) Laboratory (XL), POF Wah Cantt
- Dimensional Metrology Laboratory (DML), POF Wah Cantt



- Metallurgical Laboratory (ML), POF Wah Cantt
- Neutron Activation Analysis Laboratory, PINSTECH, Nilore
- Fuel Research Centre (FRC), PCSIR, Karachi
- Process Laboratories, Pakistan Steel, Karachi
- Pakistan Tobacco Company Ltd. Akora Khattak, Nowshera
- SGS Pakistan Textile Laboratory, Lahore
- Mirage Rebuild Factory (MRF), PAC Kamra
- Kamra Avionics and Radar Factory (KARF), PAC Kamra
- Pakistan Council of Scientific & Industrial Research, Peshawar
- Mineral Testing Laboratory, Exploration Promotion Division, Peshawar
- Efroze Chemical Industries (Pvt) Ltd, Karachi
- Textile Testing International, Lahore
- SGS Chemical & Environmental Laboratory, Karachi
- Sarena Industries & Embroidery Mills (Pvt) Limited
- Food & Biotechnology Research Centre (FBRC) PCSIR Labs Lahore
- Attock Refinery Ltd, Rawalpindi
- Interloop Limited, Faisalabad
- Shaigan Pharmaceuticals, Rawalpindi
- Lucky Textile Mills, Karachi
- University Diagnostic Laboratory (UDL), UVAS, Lahore
- WTO-Quality Control Laboratory, UVAS, Lahore
- Pakistan Institute of Minerals & Advanced Engineering Material (PITMEAM)
- Applied Physics Computers & Instrumentation Centre (APCIC) (Calibration laboratory)
- Glass & Ceramics Research Centre (GCRC)

