

Promotion of Agriculture in Balochistan (Research Study)



This paper studies the steps adapted to promote the agriculture sector and its impact on the agricultural production in Balochistan

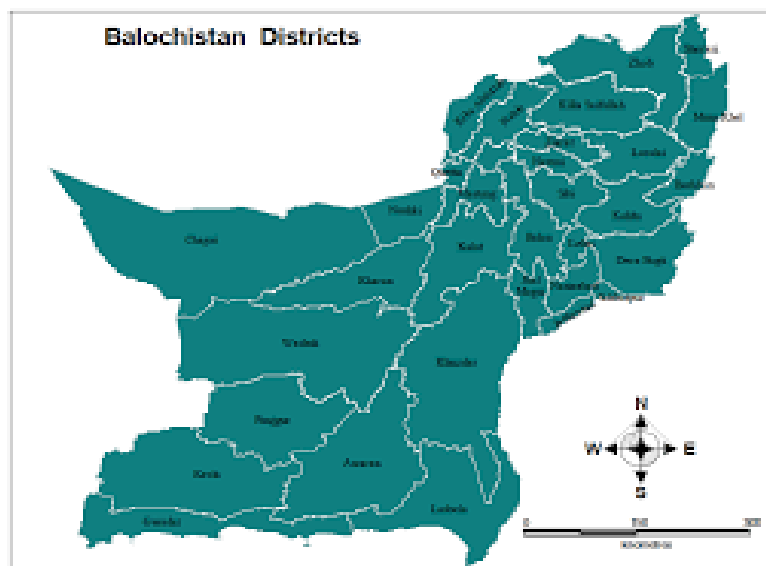


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1. INTRODUCTION

Balochistan is situated in the South Eastern part of the country. Quetta is the provincial capital and largest city of the province. It occupies the very southeastern-most portion of the Iranian Plateau, the site of the earliest known farming settlements in the pre-Indus Valley Civilization era, the earliest of which was Mehrgarh, dated at 7000 BC, located in modern-day Pakistani province of Balochistan. It covers an area of 347,190 square kilo meters (134,050 sq mi) and it is Pakistan's largest province by area, constituting 44% of Pakistan's total land mass. Balochistan is divided into 34 districts.



The capital city Quetta is located in a densely populated portion of the Sulaiman Mountains in the north-east of the province. It is situated in a river valley near the Bolan Pass, which has been used as the route of choice from the coast to Central Asia, entering through Afghanistan's Kandahar region. The British and other historic empires have crossed the region to invade Afghanistan by this route.

Balochistan is rich in exhaustible and renewable resources; it is the second major supplier of natural gas in Pakistan. The province's renewable and human resource potential has not been systematically measured or exploited due to pressures from within and without Pakistan. Local inhabitants have chosen to live in towns and have relied on sustainable water sources for thousands of years.

According to the 2017 census, the province had 12,344,408 inhabitants which are 6% of the total population of the country. Whereas 1,568,780 inhabitants are living in urban areas while 4,997,105 are settled in rural areas.

1.1 Tribal Groups

The main tribal groups in the province are the Baloch people and the Pashtuns, who represents 52% and 36% of the population respectively (according to the preliminary 2011 census). The

remaining 12% comprises smaller communities of Brahuīs, Hazaras along with other settlers such as Sindhis, Punjabis, Uzbeks and Turkmens. The name "Balochistan" represents "the land of the Baloch". Mainly underdeveloped, its provincial economy is occupied by natural resources, especially its natural gas fields, as per the estimate it has the enough capacity to supply Pakistan's demands over the medium to long term. Aside from Quetta, the second-largest city of the province is Turbat in the south, while another area of major economic importance is Gwadar Port on the Arabian Sea. Baluchistan is renowned for its unique culture and extremely dry desert climate.

1.2. Cultivated and Uncultivated Area.

Out of the total area of 34.7 million hectares, hardly 2.06 million (5.9 per cent) is cultivated and 54 per cent remains current fallow due to lack of water. Besides, there are 4.85 million hectares of cultural wasteland which can be brought under cultivation subject to the availability of water.

Although the total cropped area of Balochistan is 3.8 per cent of the total cropped area of the country (22.76 mha), and yet the province is the largest contributor to the national production of apples (82 per cent), peaches (69 per cent), grapes (97.6 per cent), pomegranates (82 per cent), dates (64 per cent), almonds (93.5 per cent) and plums (49 per cent). However, over-irrigation has resulted in severe over-mining of ground water.

Again, in spite of limitation of irrigation water, yields per hectare of several crops are highest in the country such as castor seed, while those of Mash, Jowar and Sesamum crops are the second highest in the country.

Province-wise production of crops is depicted as follows.

Table 1.1
Province Wise Production of Crops From 2011-12 to 2016-2017

(Production 000 Tones)							
Sr. No	Crop	Year	Punjab	Sindh	KP	Balochistan	Pakistan
1	Barley	2011-2012	20.00	5.40	23.10	17.20	65.70
		2012-2013	22.50	5.10	22.80	16.80	67.20
		2013-2014	21.70	5.30	21.90	17.60	66.50
		2014-2015	20.80	5.00	21.10	15.90	62.50
		2015-2016	20.10	5.20	20.30	15.00	60.60
		2016-2017	201.10	4.70	18.50	14.70	58.00

2	Wheat	2011-2012	17738.90	3761.50	1130.30	842.70	24473.40
		2012-2013	18587.00	3598.70	1257.60	768.10	24211.40
		2013-2014	19738.90	4002.10	1363.10	875.30	25979.40
		2014-2015	19281.90	3672.20	125.90	872.10	25086.10
		2015-2016	19526.70	3834.60	1400.50	871.30	25633.10
		2016-2017	20466.30	3910.40	1365.10	931.80	26673.60
3	Sugar Cane	2011-2012	42893.00	10788.30	4684.30	30.8	58396.40
		2012-2013	42982.0	15966.20	4770.20	31.5	63749.90
		2013-2014	43704.00	18362.50	5361.40	32.2	67460.10
		2014-2015	41074.30	16613.80	5107.00	31.6	62826.70
		2015-2016	41968.20	17984.30	5498.30	31.7	65482.50
		2016-2017	49613.00	20208.90	5628.70	31.6	75482.20
4	Castor Seed	2011-2012	0.04	0.28	.00	3.82	4.14
		2012-2013	0.02	0.24	0.00	4.10	4.37
		2013-2014	0.02	0.25	0.00	4.38	4.65
		2014-2015	0.02	0.25	0.00	2.32	2.58
		2015-2016	0.02	0.23	0.00	1.60	1.85
		2016-2017	0.01	0.21	0.00	1.60	1.82
5	Mash	2011-2012	6.40	0.10	1.00	3.40	10.96
		2012-2013	6.10	0.10	1.10	3.60	10.90
		2013-2014	6.00	0.10	1.10	3.20	10.40

		2014-2015	5.40	0.10	0.80	2.70	9.00
		2015-2016	4.90	0.10	0.90	2.60	8.50
		2016-2017	3.60	0.10	0.70	2.80	7.20
6	Jowar	2011-2012	101.90	14.90	3.60	16.70	137.10
		2012-2013	94.40	12.00	3.70	12.40	122.50
		2013-2014	86.40	12.00	6.70	17.80	122.90
		2014-2015	85.10	11.60	2.60	15.20	114.50
		2015-2016	126.10	12.30	4.80	17.30	160.50
		2016-2017	1130.30	12.40	4.80	18.20	148.70
7	Sesamum	2011-2012	23.50	2.30	0.10	4.40	30.30
		2012-2013	21.80	3.20	0.10	4.00	29.10
		2013-2014	24.50	3.40	0.10	4.60	32.60
		2014-2015	25.80	3.80	0.10	4.60	34.30
		2015-2016	24.80	3.20	0.10	.70	31.80
		2016-2017	25.50	4.80	0.10	3.70	34.10
8	Rice	2011-2012	3277.00	2260.10	94.70	528.60	6160.40
		2012-2013	3478.00	1843.90	93.80	120.20	5535.90
		2013-2014	2481.00	2617.30	111.90	587.90	5798.10
		2014-2015	3648.00	2652.60	131.00	571.20	7002.80
		2015-2016	3502.30	2572.80	153.80	572.70	6801.60
		2016-2017	3475.00	2661.60	158.20	554.50	6849.30

9	Maize	2011-2012	3441.70	2.90	887.90	5.90	4338.30
		2012-2013	3353.10	3.60	858.30	5.10	4220.10
		2013-2014	4020.80	3.50	914.80	5.10	4944.20
		2014-2015	4019.90	3.40	909.70	3.80	4936.80
		2015-2016	4391.20`	3.60	873.00	3.10	5270.90
		2016-2017	5237.20	3.60	890.10	3.40	6134.30

Source:- Agricultural Statistics of Pakistan

These yields are still 50-70 per cent below their achievable potential. FAO experts in Pakistan suggest that there is still great potential of increasing provincial crop yields by following modern crop production technology.

1.3.Cropping Seasons

There are two seasons of crops, namely Kharif and Rabi seasons. These crops are sown in summer and harvested in late summer or early autumn, while Rabi crops are sown in winter or early summer and harvested accordingly. Rabi crops are wheat, barley, vegetable and fodder are important

The crops grown during Kharif are fruits, melons, vegetables, potato, fodder, onion etc. Almost all the crops grown during Kharif season are cash crops, reflecting that the farmers are commercial, minded; as they mostly produce for the market. This also indicates that agriculture in the province is a settled sector. In addition to this melon is the crop which is sown both on irrigated and un-irrigated areas. Showing that the farmers are rational as they scarce resource (water) in an proficient and effective manner.

Rural women are indulged in the agricultural activities inside their houses. Some old women do take part in agriculture activities, for which they are not paid. At the time of sowing and reaping the crops, the demand for seasonal labour raises and male labour is employed on daily wages for this function. Rural local male labour has been replaced to some extent by skilled Afghan refugees, who are reliable and obedient.

2. BACKGROUND OF AGRICULTURE IN BALOCHISTAN

i) Land Ownership and Tenure System

As far as the land ownership in the region is concerned, the cultivated area is under personal ownership. Those lands which have not been brought under governmental control belong to the tribe residing in the area. Farming is normally done by landlords with the help of laborers on the pattern of share cropping or with the laborers on cash contract for an agricultural year.

ii) Cropping Pattern

Balochistan does not produce subsistence crops. Moreover those crops, whose water requisite is very high compared to the market price, are not formed. During Rabi, wheat captures the major percentage of the irrigated area consisting of vegetables, cumin, fodder and barley. In Kharif season, a major share goes to fruit production followed by vegetable and melon. Onion and fodder are also vital Kharif crops. Having a glance at the nature of Rabi and Kharif crops, it is obvious that the farmers mostly produce for the market. Within fruits apples and grapes can be singled out as major province fruits. Wheat is the second major crop. Vegetables hold third place in ranking.

iii) Organization of Production/ Farming Systems

Female labour involvement in the agriculture/ horticulture sector is negligible. Due to irregular tribal setup, female labour is not involved either in Rabi or Kharif. Farming production decisions are taken by the male members of the household. During peak season when the need for casual labour arises, they are hired on daily wages or a special contract for the entire time period is negotiated. In the most of the agricultural work is done through mechanization i.e tractors are used for the ploughing of land and tube wells are being used for watering the fields. Therefore, manual labors are not as such required.

iv) Share tenancy:

This system makes the owner of the land enable to bear the cost of inputs and the production is divided according to a set formula.

v) Cash tenancy:

This system allows the owner of the land to give his land for an agricultural year on an agreed amount.

vi) Crop sharing system:

In this system, the land owner shares his land with the cultivator and whole costs of production is paid by the cultivator and usually 1/5th of the production is provided to the owner of the land. With the passage of time, the use of advanced technology. From bullock to tractor and from manual cropping to thresher, from traditional fertilizer to the use of chemical fertilizers, and from

subsistence crops to cash crops. The nature of agricultural production has been changing rapidly. As a result traditional agriculture is converting into modern agriculture.

2.1. Irrigation.

The main source of irrigation during the last quarter of the 19th century was through “Karez ”. The structuring of “ Karez ” and its maintenance was a costly matter. The expenses for plowing and maintaining “ Karez ” had to be shared by water clients in proportion to the share held by each in the land. Currently tube wells have become the major source of irrigation, as this system allows having control over time and quantum of water to be used. In other words water resource consumption has become more resourceful and effective. The owners of tube wells personally maintain their private owned tube wells. Whereas the maintenance of government owned tube wells is the responsibility of the Irrigation Department. The “ Karez ” and springs are maintained through province contribution.

There are some tube wells which are not being utilized. And the reason is that these tube wells are situated in those areas where the water table has go down due to surplus uplift, or mechanical breakdown. Of the canal irrigated area, about 84 per cent is in Nasirabad Division alone which is nearly 5 per cent of the province, while 6.8 per cent is in Mekran Division, 4.7 per cent is in Kalat Division, 3.9 per cent in Sibi Division and negligible in Quetta and Zhob Divisions. Thus tube-wells are the major source of irrigation outside the canal irrigated areas followed by karezes, springs etc.

The number of tube-wells increased from 17.982 in 2013 to 27.906 in 2018. This indiscriminate expansion-authorized and unauthorized- has led to over-mining of ground-water and its lowering by two meters or more annually.

As a result, there is now no ground water potential in Quetta, Pishin, Mustong, Mangochar and Pishin Lora due to their over-mining. Porali River basin has good potential, while Zhob, Qilla Saifullah, Nari River, Humun-e-Lora and Kachhi Plain have a limited potential.

Some of these basins covering nearly 30 per cent of the province have already been overdrawn and face drought-like conditions. At places, orchards have already been dried up and there is not even drinking water and villagers have to shift to other places.

In order to overcome this problem following measures may be taken. Instead of over-irrigating orchards with conventional gravity flow (flood irrigation), drip irrigation system should be adopted.

a) Drip Irrigation System

Drip irrigation is a planned irrigation system in which all necessary facilities are installed for efficiently applying water directly to the root zone of plants by water emitters operated under low

pressure. Drip irrigation system is suitable for crop cultivation when irrigation water or rainwater is not enough for conventional farming.

There are two types of drip irrigation systems are designed and installed at National Agricultural Research Centre, Islamabad under water component of PAK-China collaboration project. The first one is micro sprinklers for nurseries and 2nd one is over head micro sprinkler for vegetables in tunnels.

The area covered by each micro sprinkler is 113 ft² with a discharge of 93 Liters per hour. These systems are working with 90 % water application uniformity at pressure head of 15 psi. Micro irrigation systems are capable to apply irrigation water along nutrients to crops grown in tunnels. Under the stressed environment of D.I. Khan drip irrigation systems were designed and installed at ten different locations on farmers' fields for orchards and vegetables. 25% water saving and 30% yield increase attracted the attention of NGOs and Progressive farmers for adaptation of these systems in the area.

b) Sprinkle irrigation system



The sprinkler irrigation system applies small amounts of water at frequent intervals to a unit area of crop. It consists of a span of pipe which is supported on wheeled A-frame towers and is self-propelled around a central pivot point. The pipe delivers the water to the sprinklers. Water is usually delivered to the pivot point through a buried mainline pipe. The system may vary in length from approximately 60 m to 790 m (200 to 2,600 ft.) and is capable of irrigating a circular area up to 200 ha (500 ac.). Pressure required at the pivot may vary from approximately 70 kPa (10 psi) when low-pressure spray nozzles are used, to 550 kPa (80 psi) when high-pressure impact sprinklers are used. Center pivot applications have also expanded into the realm of applying not only water but also nutrients and chemicals to the crop via fertigation and chemigation. Today a grower can apply water and chemicals with precision uniformity and high irrigation efficiency. Pakistan Agricultural Research Council through its Agricultural Water Management Program, Climate Change, Alternative Energy and Water Resources Institute, National Agricultural

Research Centre, Islamabad installed centre pivot systems (CPS) in all provinces for research and demonstration purposes.

c) Trickle irrigation

Trickle irrigation is a system where water and fertilizer are applied through sprinkler directly to each plant instead of irrigating the entire area as in surface irrigation systems. For orchards and widely spaced crops, it is accomplished with small diameter laterals running along each plant row. Emitters are attached to the lateral supply water to each plant to meet crop water requirement.

This system needs high initial investment and is energy intensive. But at the same time, it is labour, water and fertilizer efficient. No investment is needed in land leveling, but maintenance requirement of the system is often more expensive than surface irrigation systems. A major economic factor in the use of trickle system is the cost-effective application of fertilizers and pesticides.

This system has been installed for demonstration at fields in coastal areas of Sindh and Balochistan and also installed at CARS, PARC in Karachi on two acres area by using one horse power single phase motor, where orchards like guava, ber and chiku are grown.

Cost of trickle irrigation system gets minimized when operated continuously during the critical demand period. In addition to reduced irrigation water requirement and minimization of return flows, trickle irrigation has other positive advantages like effective water control. Low rate of water application also reduces deep percolation losses.

The plant canopy remains completely dry under the trickle system. It reduces fungus incidence and other pests, which depend on moist environment. Experiments of trickle irrigation on crops like tomatoes, grapes and sugar beets have shown significant earlier maturation in comparison with other irrigation systems. High temporal soil water level can be maintained with trickle systems. This system results in increasing yield and quality of the crop.

On the other hand, there are some problems with the trickle irrigation system. The most important among them is that small flows through emitters require small openings that have historically been plagued by clogging. With the smaller emitter orifices, more filtering and biological controls are needed. Great advances have been made to rectify this problem but it will always need the attention of the designer.

d) Rain Gun Sprinkler Irrigation System

Similarly like trickle irrigation system, rain gun sprinkler irrigation system is also being applied in coastal areas, and different types of rain guns have been introduced in collaboration with local industries and progressive farmers. No doubt initial cost of installation of this system is high but it is effective and recommended on practically all types of soils, topographic conditions and almost all kind of crops.

e) “ Karez ” system

Land is infinite in Balochistan. It is the one place in South Asia where possession of land is not important. Instead, it is water that matters. In Balochistan, social rank is not determined by landholdings but by the size of one’s share of water in a “ Karez ”. These manmade underground channels passively tap groundwater and provide the lifeblood of villages at the valley floor.

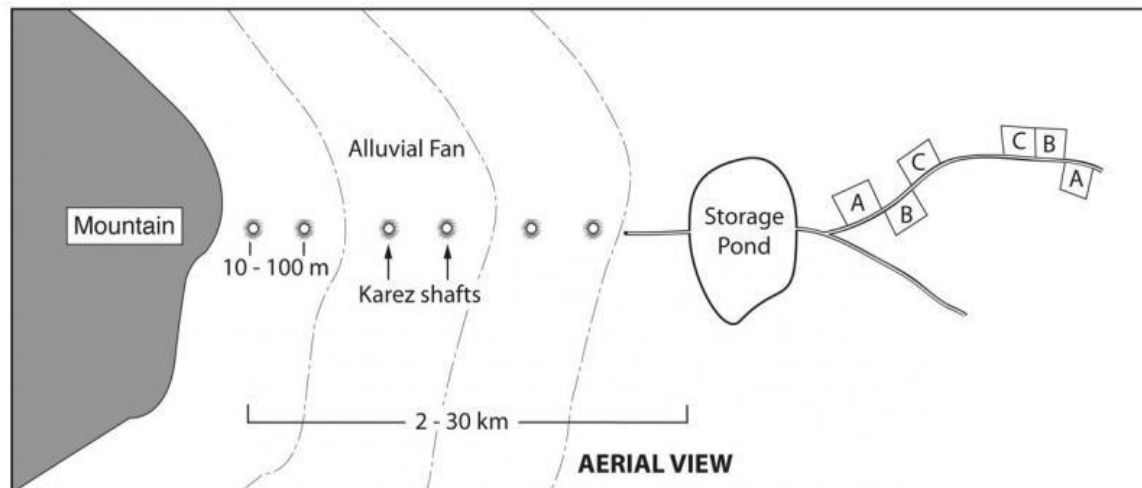
“ Karez ” is a native method of irrigation in which groundwater is tapped by a tunnel. After running for some distance the tunnel comes out in the open and the water is conducted to the command area. “ Karez ” irrigation is adapted in 22 countries from China to Chile including Pakistan. In Pakistan it is restricted to the province of Balochistan which has a tribal society.

The first well where the water is tapped for a “ Karez ” is called the mother well, and there is a zone of roughly 1,200 feet in diameter where it is forbidden to dig new wells or otherwise intimidate the quality and quantity of the groundwater. The vertical shafts along the underground channel are merely for maintenance purposes, and water may only be used once it emerges from the daylight point.

The key advantage of the “ Karez ” system is that it taps the water inertly and therefore does not contribute to groundwater depletion, though the downside is the ensuing dependence on seasonal water flow fluctuations. These structures are found all over West Asia, Central Asia, North Africa, Spain, and even as far as Peru, Mexico, and Japan. Many of the “ Karez ” in Balochistan are hundreds of years old, and although they are generally not as architecturally metaphorical as those in neighboring Iran, they carry equal, if not greater, import in the economic and cultural life of the region.

The Soviets understood the importance of “ Karez ” in the 1980s and were thorough about destroying them in Kandahar and southern Afghanistan in an effort to break the rebellion. The historical importance of “ Karez ” stretches back far before the 1980s, however. “ Karez ” in Kandahar were used to water the vineyards that produced wine that Babur—the first Mughal emperor of India—eagerly awaited in the sixteenth century, on the plains of Bhera in northern Punjab, where Alexander the Great had also made camp during his Indian campaign.

As “ Karez ” requires considerable social organization for their maintenance, strong social capital undergirds the system. Universally recognized water rights have given rise to well-articulated water markets, in which water is frequently exchanged either on a reciprocal basis or for cash to direct it toward its most productive or socially desirable use. “Karez” communities also often hold 24 hours of water in reserve to be auctioned at the beginning of every planting season to finance “ Karez ” maintenance. These water rights can return up to Rs. 3000 (roughly \$28.44) per hour.



The “ Karez ” system is equitable between upstream and downstream users. A water user who has the first parcel of land along a “ Karez ” water course also has rights to the last parcel of land on the same channel. The user with the second parcel of land also has rights to the second to last parcel of land, and so forth. Such an arrangement ensures that everyone in the community has an equal stake in maintaining the entire water course, unlike in other irrigation systems in which the upstream water users invariably benefit and need not contribute to the maintenance of the entire water channel.

Several irrigation schemes have been sponsored by different donor agencies in district Quetta. Some of these are under tendering process, some have already been finished and some are in the process of implementation. These schemes have been funded by Government of Balochistan (Special Fund), MPA Fund and World Bank. These schemes were started for different purposes e.g.

- Flood irrigation.
- Perennial irrigation schemes.
- Small delay action dams and Flood protection work.
- “ Karez ”system.

In this context, an irrigation department is also established. The aim of Irrigation Department is to improve irrigation facilities. Since its inception the Irrigation Department is busy in monitoring / collection, compilation of water quality and hydro meteorological data planning, design and construction of Delay Action Dams, Storage Dams, Perennial and Flood Irrigation & Drainage Schemes, Flood Protection Schemes for protecting irrigated land, population and other infrastructure facilities, rehabilitation of damaged irrigation/ drainage facilities

2.2. Agricultural Mechanization

There are different ways to utilize agricultural machinery. If the machinery is owned, the farmer uses it according to his requirement. Buying a tractor is not possible in the case of very small farmers and even some of the middle class farmers are not financially in any position to buy them.

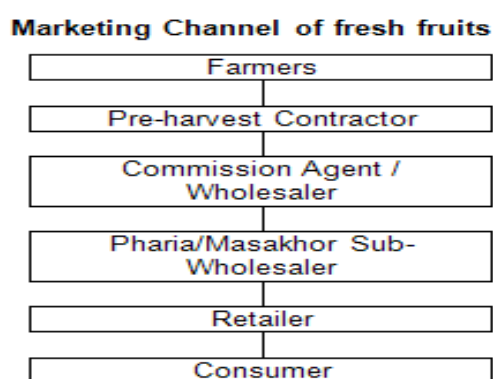
In common tractors are individually owned. The one who can't purchase the individual tractor, hire tractor services from the owner and this has introduced the concept of tractor services. As a rule (for crop growing purposes) a tractor is hired per hour. In some areas payments per hectare are considered. Tractors are multi-use machinery. In addition to ploughing and commercial use, they are also used for extracting water where electricity is not available. Similarly tube well services for irrigation are available on hourly basis. The rates may differ based on the fuel used for its operation.

2.3. Marketing

Balochistan produces large quantities of fruits and vegetables. The marketing of fruits and vegetables is not limited to the area, but in many cases crosses the provincial boundaries. As per an estimate that 60-70% of the fruit production is marketed and consumed in other regions. The market infrastructure, regulation, marketing costs, directly influence the prices received by the growers for their production. There are various mediators operating at various stages of marketing, some more active than others.

Therefore, it is vital to look at agriculture marketing in the national perception. Marketing of all agriculture production is controlled by private sector, while government is limited only to regularization and development functions. The process of marketing starts, when an orchard is sold to the pre-harvest contractor at blossom. He manages the orchard till harvest. Most of the production chains follow the dominant business force; as in the case of fruits, it is a commission agent. Who works like a bank providing credit to farmers, pre-harvest contractors and wholesalers. By providing credit, he gets a warranty that the manufacture will be marketed through him.

Table 1.2



2.4. Government/ NGO/Private Enterprise, etc. involvement in Agricultural Development

In Balochistan, various institutions are providing inputs and services to the agricultural sector. In addition to this the provincial government is also playing a leading role in the provision of agricultural services such as:

- 1) Agricultural extension

- 2) Marketing
- 3) Price setting
- 4) Irrigation development and its operation and maintenance
- 5) Agricultural Mechanization
- 6) Collection of Agricultural statistics
- 7) Agricultural research / education.

On the contrary Local Government does not play any role in agricultural development. The Federal Government, through its policies influences the agriculture sector through price setting, provision of agricultural credit through ZTBL and through commercial banks. Although the role of NGOs does not exist in this context. Moreover International donors are involved in the provision of input supplies and training facilities for the project staff. Furthermore, in the expansion of irrigation, many international donors are involved in the province. Private enterprises are also involved in the provision of almost all agricultural services with the exception of agricultural statistics/research/training and education.

3. POTENTIAL OF AGRICULTURE IN BALOCHISTAN

The economy of province is multi-sectoral in nature. Agriculture is wealthy; horticulture is the leading sub-sector within agriculture, mostly producing apples and grapes. The quality of fruit formed in Balochistan has enormous potential to emerge as Pakistan's new economic frontier. Agriculture is the foundation of provincial economy, as over 75 per cent of the population lives in rural areas. The crops contribute about 62 percent of gross farms income. This sector employs 67 percent of Balochistan's total work force. Naseerabad, Jafarabad, Dera Murad Jamali and Usta Mohammed and many areas of central Balochistan are considered agricultural regions. Except Naseerabad district, there is no perennial system of irrigation. The area depends on rain, Karezat and tube-wells for irrigation. About 11.77 million acres of land is still lying arid, barren and uncultivated

Agricultural development is linked to the development of water resources. The federal government is spending Rs 5 billion for the construction of pucca watercourses to help irrigated orchards of more than half a million acres. The province produces many kinds of fruits. It's share in the country's production of grapes, cherry and almonds is 90 per cent. It contributes 60 percent of the output of peach, pomegranate, apricot; 34percent of apple and 70 percent of dates. The apples are popular all over the world for their taste and quality and a good variety. About 0.3 million tones of best varieties of apple are produced annually. With date production of 130 varieties, the province can earn foreign exchange through exports. Makran provides about 4, 25,000 tones of dates annually, but the province has no share in national export of dates. Investment opportunities exist in date processing and apple storage projects in Balochistan. Apricot and plum are high delta fruits, which are grown in upland Balochistan. Grape is a low delta crop and may be grown in all types of climates and soils. The most popular commercial varieties grown in the province include Sundrakhani, Haita and Kashmishi.

4. MAJOR DEVELOPMENT ISSUE

The major production of the province is fruits and it has vast potential for fruit and vegetable processing industries and fresh fruit juice industry. Being the commercial minded, farmers generally produce for the market. Social and cultural factors discourage the female involvement in the agricultural sector. Whereas Water resources are scarce. Tube well is the major source of Irrigation. The installation of which, due to lower water level is very costly. The private sector as well as provincial government is playing a significant role in the provision of agricultural inputs and services.

Major issues which are being faced in agricultural sector of the province are:

- i) Poor access to institutional credit.
- ii) Water management problems.
- iii) Lack of effective co-ordination among different agricultural institutions providing agricultural services.
- iv) Lack of reliable and adequate agricultural data.
- v) Load shedding and volatile fluctuations in supply of electricity.

5. MEASURES TAKEN FOR BETTERMENT OF AGRICULTURE SECTOR IN BALOCHISTAN

Different measures are being taken for betterment of agriculture sector in Balochistan for the sake of enhancing production of food grains in the province. For this purpose the existing agriculture training institute in Quetta is being strengthened at a cost of 500 million rupees.

In addition to this a special program has been launched to enhance production of various crops through research innovations in the province at a cost of 364 million rupees. Furthermore, workshops are also being held in Kalat, Musa Khel and Jaffarabad districts to give useful advices to the peasants to adopt modern means of cultivation.

5.1. Balochistan Agriculture Project

The Balochistan Agriculture Project is supporting communities and individual farmers for increasing their production, sales, and revenues for crops. The project is introducing new technologies and practices, improved management approaches, new varieties of seeds, as well as better water management techniques. As an initiative of new approaches, the project is planning and training community organizations, farmers' marketing communal and joint marketing organizations.

To help communities for enhancing the value of their products, the project provides technical support, connect farmers to better-paying markets; and improve buyer and supplier relationships. The project is also working to increase the involvement of women in income-generating activities and is supporting the improvement of provincial agricultural policies and preparing the dictatorial frameworks for market-led and collaborative investments.

i) Objectives

The project aims to raise the incomes of 17,000 rural households (approximately 110,500 people) by 20 percent in more than 800 poorer communities in the districts of Killa Saifullah, Loralai, Mustang, Quetta, Zhob, Musakhel, Pishin, and Sherani.

ii) Main Tasks

- a) To train more than 17,000 needy farmers in 800 communities for increasing crop and livestock production as well as improve marketing structure.
- b) To promote efficient and resilient affiliation between public and private sector actors to ensure the continuous impact of project intervention.
- c) Improvement of irrigation systems through rehabilitation of “*Kareez*” systems, land leveling, and pipe irrigation.
- d) To introduce new seed varieties and better production technologies with an emphasis on value addition and increased incomes.

5.2. Improving Agricultural Production and Extension Systems

- I. In 2004 the complete directorate was established and with the name of Directorate Agriculture Research Plant Protection and Entomology and Plant Pathology Section were under this directorate, The tasks were assigned was Biological Control, Development of Integrates pest management, and control of nematodes and viruses on different crops, vegetable and fruits. Agricultural production is a very complex system. It depends on several inter related components such development of appropriate production technology, dissemination of modern technology to the end users, and the formulation of farmer friendly agricultural policies.
- II. In 2015, the provincial government had set aside Rs6.35 billion for agriculture; a plan was set to provide solar-powered tube wells to farmers of isolated areas of the province. In the harvest sector, some incentives are being introduced for improving cotton production from the current 77,000 bales to 100,000 bales and for enhancing Basmati rice cultivation. Funds are also being allocated to help farmers get certified seeds of wheat and pulses; in 2016 budget, special emphasize would be given to encouraging producers policy for the cultivation of vegetables and fruits.

5.3. Food Storage Issue is expected to get More Attention in the New Budget

More funding is planned for an ongoing Rs50 m project of apples’ grading and packaging. The project is expected to be beneficial for apple growers in Ziarat and Kalat districts and bigger fund allocation is expected to extend the program to some other districts as well. Considerable funds are planned for setting up a dates processing and packaging unit in the Makran region where the best varieties of dates are grown. Establishment of a tomato paste plant to cut post-harvest losses and improve its’ value-added production is also under planning of the provincial government. An Rs70

Millions olive cultivation project in arid and semi-arid areas would possibly get more funds out of the next annual development plan.

Some specific projects in agricultural research are expected to be announced in the next budget with an objective to improve supply of certified seeds and increase per-hectare crop yields of various crops. These projects consist of not only provision of research facilities but also construction of research centers in less-developed districts of the province.

Balochistan is a food-deficit province, and the food storage is expected to get more attention in the new budget. Officials of Balochistan's agriculture and cooperative department say the provincial government may come up with projects for food storage similar to the one recently concluded with the help of the US department of agriculture. Under that project, 78 cold storage houses and banana ripening units and drying tunnels have already been constructed by some of Balochistan's farming organizations,

Establishment of flake ice units for fish preservation, provision of financial and technical help to inland fish farmers and allocation of funds for repairing or replacement of old fishing boats are being considered for enhancing fish hauling from Balochistan's coastal areas.

Investing in women's empowerment along with men helps get rid of poverty, improve food security and nutrition and helps accomplish economic growth.

5.4. Beneficial Effects of Empowering Women in Agriculture.

Food and Agriculture Organization (FAO) of the United Nations in association with Australian government, Department of Foreign Aid and Trade (DFTA) have provided entrepreneurial skills and agri-business training to 400 women belonging to three most underprivileged districts of the Balochistan under "Empowering women in Balochistan through Agri-entrepreneurship initiatives".

The project tenure was 24 months with an aim to economically empower the women of the province as well as addressing the starvation issues in women and children by engaging a major part of the population in economic and livelihood activities.

It was started in April 2017 and completed in March 2019 and women from the districts of Nushki, Chaghai and Queetta where training was conducted on agri-business and entrepreneurial skills, this project is expected to be extended in next phase to other districts of the province in public private partnership, Under the program, the women were provided training about sheep fattening, wool spinning, dyeing and rug making.

In addition to this they were also trained for the chick raising, egg production and seedling production. In the meantime, training for women from these districts were also conducted for apricot processing (drying) ghee production and other milk products to enhance their farm income, which had notably increased their profit share and improved their farm income.

In order to overcome the issues of starvation, the FAO in collaboration with Australian government had also trained over 5,000 men and women from six most ignored districts of Balochistan to bring them in economic mainstream. They were trained under Australia-Balochistan Agri-Business Program (AusABBA) phase II, which was started with the financial support of Australian government to help

and build up the FAO's initiatives and involvements for the boost up of the agriculture and livestock sectors of the province. These 5,000 beneficiaries were individual families and each family comprised of average seven to nine children and the outreach of the program had covered about 45,000 under nourished population by increasing their income and agriculture produces.

Moreover, 330 women were also trained for integrated homestead garden to grow their own vegetables, fruits and herbs for fresh and preserved consumptions in six districts and as a result these women had also established their own gardens. AusABBA program also helped for training 114 male and female farmers from these districts on feedlot fattening and distributes 1,160 small ruminants including sheep and goats for breeding, fattening and marketing in five districts.

The FAO had also provided 1,160 bags comprising 40 kg animal feed on cost sharing basis with male and female farmers. The FAO with assistance of its development allies and provincial government had also extended the program to the other districts of the province and would further trained 5,000 farmers under AusABBA II by 2020 to generate demand for agriculture inputs, services and products and will help households by engaging them in agriculture to adopt maintainable, productive and diversified strategies.

5.5. Establishment of Agriculture University in Balochistan.

As regards the establishment of Agriculture University at Quetta, that was direly needed in the province. Such universities like, for example, the University of Faisalabad in Punjab, have already contributed tremendously towards agricultural development and growth as a result of research carried out in crucial areas of agriculture. It is a well-known fact that good quality seeds giving higher yields of cash crops and other crops have been produced in agriculture universities.

Establishment of Agriculture University in Balochistan will turn the unproductive lands into cultivable farms. As Balochistan is blessed with thousands of acres of agricultural land which, if cultivated, can enable us to produce surplus agricultural produce for earning valuable foreign exchange by exporting surplus agricultural items.

5.6. Zero Tillage

Under the Agricultural Innovation Program (AIP) for Pakistan and in collaboration with Balochistan Agriculture Research, CIMMYT has begun testing and spreading with farmers the practice known as "zero tillage" to sow wheat in Balochistan, which is a province in southwest Pakistan that comprises of more than 40 percent of the country's land area but only five percent of the population.

Jaffarabad and Nasirabad are major rice- and wheat-growing districts in Balochistan. The major cropping systems are either fallow or rice, followed by a crop of wheat. Soils after rice are poorly-drained and hamper tilling for wheat, so wheat is not sown soon enough to avoid the high temperatures that arrive in spring, when the crop is filling grain. This seriously reduces yields.

On 10 January, 2015 more than 100 participants gathered for a field day organized by AIP in Balochistan province to promote zero tillage for wheat. Involving the direct sowing of wheat seed into residue of the preceding rice crop, with no plowing, the practice has multiple benefits for farmers, soils and water use. These include more timely wheat planting, reduced land preparation costs, higher wheat yields and increased cropping system intensity (hence, productivity).

5.7. Mobile Technology

With a view to provide extension services to the small farmers, the Punjab Agriculture Department has engaged Centre for Agriculture and Biosciences International (CABI), an international organization to make use of mobile technology and reach out to thousands of farmers through their cell phones. CABI is reaching out to these farmers through voice calls and SMS and has translated the contents of SMS and voice messages in Urdu to overcome literacy barriers of recipients. In this context, a help line has been activated to provide real time advice to farmers for crops related issues, which is supported by a panel of field experts. This has also created potential for approaching small farmers in far flung areas and enhancing their capacity in crop management, pest management, productivity enhancement and other areas.

5.8. Contribution of ADB (Asian Development Bank)

Agriculture is the backbone of Baluchistan's economy. This project will build irrigation channels and dams, and introduce efficient water usage systems and practices, to help farmers increase food production and make more money.

Among the infrastructure that will be improved or built for the project is a dam able to hold 36 million cubic meters of water, 276 kilometers of irrigation channels and drainage canals, and facilities that will make it easier for people, especially women, to access water for domestic use. Around 16,592 hectares (41,000 acres) of land will be added or improved for irrigation under the project.

The project will protect watersheds through extensive land and water conservation efforts, including planting trees and other measures on 4,145 hectares of barren land to combat soil erosion. Moreover, Part of the project's outputs is the pilot testing of technologies like solar-powered drip irrigation systems on 130 hectares of agricultural land, improving crop yields and water usage on 160 fruits and vegetable farms, and demonstrating high-value agriculture development.

The project will also establish a water resources information system that will use high-level technology such as satellite and remote sensing to do river basin modeling and identify degraded land for rehabilitation.

By adopting diverse techniques to improve the crops production in the province Baluchistan, a tremendous development has been achieved on this account as percentage share of the said province in the principal crop production of Pakistan has increased significantly.

6. FRUIT & VEGETABLE BASKET OF BALOCHISTAN

Table 1.3 PRODUCTION OF FRUIT – BALOCHISTAN

(Production in Tones)

FRUIT	2013-14	2014-15	2015-16	2016-17	2017-18
Citrus	7,471	6921	6804	6953	6910
Mango	1,076	1076	1247	1140	2170
Banana	2,707	1546	7907	11654	17013
Apple	510,203	522729	527642	576376	491827
Grapes	65192	65005	65226	65386	66215
Pomegranate	32355	30223	29046	26868	26450
Guava	2708	2561	2570	2494	2494
Dates	200013	199832	211340	180762	180695
Apricot	163856	157651	161901	154525	130248
Peach	19300	18101	18543	16859	15538
Pear	522	522	398	465	427
Plum	28294	27863	29024	24392	21099
Almond	20490	20818	20444	20736	19527
Fig	81	67	63	63	63
Loquat	126	81	81	81	81
Chikoo	2858	2858	3171	3142	3142
Coconut	8782	8782	8749	8630	8630
Cherry	2027	2083	2140	2067	1964
Pistachio	659	659	706	667	654
Papaya	4388	4388	3590	3525	3525
Melons	113786	103062	102076	104733	100467
Others	18364	4752	4898	4349	3692
Total	1205258	118180	1207566	1215867	1102831

As shown by the table 1.2, the production of fruits in the Baluchistan province has been decreased with the passage of time as compared to 2013 to 2018 and reasons are climate change, lack of rains and dryness.

Table 1.4 PRODUCTION OF VEGETABLES – BALOCHISTAN**(Production in Tones)**

VEGETABLE	2013-14	2014-15	2015-16	2016-17	2017-18
KHARIF					
Lady Finger	17283	16541	16124	16512	14813
Squash (Tinda)	4867	5311	5342	5918	6007
Brinjal	11548	12264	12273	11764	10621
Bitter Gourd	3219	3453	5270	4566	4847
Bottle Gourd	6388	5394	5504	5223	4701
Pumpkin	8310	7140	5795	5722	6239
Lufa	2183	2187	2322	2515	1732
Cucumber	8345	6872	6784	7159	6672
Tomatoes	54554	56359	56429	60263	55120
Others	2961	3309	3110	3037	10089
Total	119658	118830	118953	122679	120841

RABI

Radish	24153	24226	24211	25125	25324
Turnip	16778	16442	16115	16329	16593
Carrot	52381	52473	53184	56568	55355
Spinach	23458	23464	24653	24862	26051
Cauliflower	32304	32708	32594	33695	32134
Cabbage	9065	10066	10446	10642	10098
Peas	12369	12674	12286	12760	12369
Sugar beet	5885	2200	1100	550	275
Tomatoes	108714	85197	87985	83601	85446
Beans (Baqla)	5597	5299	5358	5489	5559
Others	5123	5129	5132	5049	5221
Total	295827	269878	273064	274670	274425
G. Total	414657	269878	392017	397349	395266
Potato	30471	30043	28832	22425	23405
Balochistan	Production in Tones				
Condiments					
Onion	492704	515486	514572	531754	680286
Garlic	7541	7491	7820	8621	9210
Chillies	6795	6125	6120	6155	6268
Coriander	1000	986	994	1004	1046
Total	508040	530088	529506	547534	696810

Source:- Provincial Crop Reporting Service Centers

While considering the production of vegetables in Kharif season, which has increased considerably from 119658 tones (2013-14) to 120841 tones (2017-18) showing a growing rate of 0.99% in production.

At the same time, in Rabi season the production of vegetables has declined from 295827 tones (2013-14) to 274425 tones (2017-18) significantly with a decreasing rate of -7.23, reason for this reduction needs to be find out.

Whereas considering the condiments, production has been increased from 508040 tones (2013-14) to 696810 tones (2017-18) showing a growth rate of 37.16%, that is a tremendous increase in the production. This is the good sign and shows that agriculture is growing in Baluchistan.

7. ROLE OF ZTBL

ZTBL is specific financial institution which accommodates agriculture sector. ZTBL fulfills farmer's pivotal needs in its operations, and by providing banking and financial facilities to small framers on possible and sustainable basis is bank's core business. Through this approach and in line with its consent, ZTBL functions at high risk prospect, where bank has been decisive hard within its obtainable resources to convene utmost demand of agri. related actions. ZTBL's model of business payments has been changed after 57 years in January 2019 and it has been digitalized and ZTBL has installed 40 ATMs during Jan-May 2019.

7.1. Major contributions for promotion of agriculture in Balochistan

ZTBL is helping the farmers by lending in Balochistan. In this context, 40 MCOs have been posted to extend services to the farming community through its network of 34 branches in 24 districts of Balochistan. Whereas total Agri disbursement of Rs. 15404.6 million extended to 645 farmers and a target of Agri credit recovery as 265.561 million is achieved as of 31st Dec, 2018. ZTBL is also allocating special fund of Rs.137.607 million each year for Baluchistan. In 2017, ZTBL has opened one new branch in Balochistan to facilitate the general public of the area. Furthermore, bank is increasing its business with enhanced outreach in districts of Balochistan by installing ATMs in ZTBL branches. In this respect, an ATM (Automated Teller Machine) has already been installed and serving for transactions in Quetta branch. Government of Pakistan brought about a way to increase capital in its 100 days agenda according to which computerized bill transactions, add-deposit, and promotion of Islamic Banking for ware-house receipt financing the Collateral Management Companies circle was worked upon to further legalize safety rules.

- a) ZTBL has also signed an agreement with 1LINK, the largest payment switch in Pakistan to facilitate it's customers with digital banking services in all provinces including Balochistan. Through this partnership, farmers in the said province can use all Pakistan's ATM & other offers of 1LINK including Inter Bank Funds Transfer i.e. instant real time transfer of funds between accounts and Bill Payment Services. The collaboration has also empowered ZTBL customers to use PayPak cards these are accepted on all ATM & POS networks across Pakistan.

- b) Another launched scheme is for preservation/de-hydration of dates (Chuhara making) and is applicable in dates growing areas of the district like Turbat Zone. Its financing limit is up to Rs. 0.500 million per borrower/party. During the year 2016, Bank provided loans amounting to Rs. 49.527 million against 326 numbers of cases under this scheme.
 - c) In 2018, ZTBL has provided assistance to farmers of Balochistan by providing 465 animal vaccinations and 917 artificial inseminations. Besides 22 demo plots were constructed and 174 field visits were completed by MCO's. In addition to these 45 farmer's trainings were conducted and 5 demonstrations were also performed for solar tube well products.
 - d) ZTBL has also offered loans of joint venture to government of Balochistan, through this offer the government of Balochistan has reserved Rs. 250 million from their 2019-2020 budget funds for Balochistan Green Tractor Scheme. ZTBL will sponsor 1000 tractors under this scheme.
 - e) ZTBL has also taken considerable measures for the problem recognition and to increase Apple production.
- ZTBL is providing loans to the farmers for developing Apple Orchards, loan for already developed apple orchards for drip irrigation and facilitating the farmers for their working capital requirements.
- a) Keeping in view the situation of Olive in Balochistan it has been observed that lack of knowledge regarding olive trees, Olive benefits and olive marketing. It is recommended that there is a dire need to educate people regarding olive awareness and also educate the farmers to consider olives as an agri-business.
- ZTBL is introducing olives as low delta crop
 - Providing loans to the farmers for developing Olive Orchards
 - Providing loans to already developed olive orchards for drip irrigation.
 - Increasing the income of the farmers through cultivation of olive plants on the farmers' fields.
 - Planning to impart olive awareness and maintenance trainings to the farmers.
 - Capacity building on value addition of olives (Olive achar, olive kehwa etc.)
 - Providing loans to interested loonies for olive oil extraction plants.
 - olives destoning machine can be considered as loan able items for farmers (US \$5,000-10,000)
- b) Wool has a high potential for development in Baluchistan and this significant resource can be used to develop livelihoods of rural farmers including women.
- ZTBL is facilitating wool farmers by providing loans to obtain modern machinery for wool shearer.
 - ZTBL can play a vital part in farmer community by conducting trainings and equipments for better shearing to get maximum wool with highest quality.
 - The Bank can engage the females in wool trainings and for establishment of a collection point for wool processing.

- Trainings sessions on simple techniques to convert wool into high value products such as scarf and small rugs using loom can be conducted as beneficial activity.
 - Gun Shearer farmer can be useful for shearing animals in almost 6 minutes as compared to commonly scissor which take 30 minutes.
- c) Balochistan's climatic and soil condition are strongly favorable for the production of the fruits especially pomegranate.
- ZTBL can offer credit to farmers for drip irrigation in orchards.
 - ZTBL is planning to arrange workshops, seminar, and trainings to update the farmers about the modern production practices
 - Small value addition process unit can also be established in future.
- d) Previously, almond was grown mainly in Balochistan province. However, with the introduction of early ripening varieties, this has now become possible to grow the crop in comparatively dry areas of pothwar region wherever soil irrigation is available.
- ZTBL can also create awareness among farmers by conducting training sessions regarding almond production technology.
- e) Currently, the farmers are using centuries old date palm cultivation techniques, which are mostly time and labour intensive, resultantly the production costs are higher and net returns are lower than the achievable value.
- ZTBL can provide knowledge to farmers regarding dates issues and modern technology of dates by Experts in Training Sessions
 - ZTBL can provide Pollinations guns and covering bags to save the fruit from losses.
- f) Balochistan excessively depends on Sindh and Punjab to meet its wheat requirement. The province faces the problem of food insecurity. It requires 900,000 metric tons of wheat annually to feed its population of 6.8 million people.
- ZTBL can provide loan to the farmers for purchase of inputs like seeds, fertilizer for timely sowing to resolve the non-availability of agricultural inputs and water Scarcity:
 - Moreover ZTBL can also provide the loan and technical guidance to build water-Harvesting channels.
- g) Pakistan Saffron is being cultivated in Quetta and colder area of Baluchistan, which have suitable climatic and ecological conditions for cultivation and production of Saffron.
- ZTBL can play vital role for promoting the Saffron in Balochistan for achieving high quality yield.
 - The Bank is raising the awareness about saffron usage and introducing new saffron products to families, restaurants, etc.
 - ZTBL can also work on the improvement of distribution system in local markets.
 - Bank has also planned to conduct workshop, trainings and seminars to create awareness to ensure high productivity through good corm and other best practices.

n) Balochistan is contributing 40% in the total production of the tomatoes in Pakistan because of its ideal temperature for growth. The main growing areas are Barkhan, Killa Saifullah, Nasirabad, Jaferabad, Qallat. Quetta, Pashin, Ziarat and Mastung.

- ZTBL can facilitate farmers by providing credit for tunnel farming of tomatoes.
- It has also decided to arrange seminars, workshops with the help of research institutes to create awareness about tunnel farming and production technology of tomatoes.

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