

Value Chain Study

TROUT AQUACULTURE IN KP



Turn Potential into Profit

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1 HISTORY AND BACKGROUND OF THE SECTOR

Fisheries as a sector can be elaborated based of economical activities; such as production, processing and Marketing. This has been further elaborated by FAO; Fisheries comprise of (Wild Fish stocks catch, Fishers, equipment such as boat, nets) and Aquaculture culture of aquatic living organism (Plants, Animals, crustaceans, etc) in a confined environment (Infrastructure {Raceways, Ponds} fish seed, fish feed and equipment, programmed harvest of fish). The Trout Aquaculture is about the cold water fisheries.

The history of Trout Fish dates back to the year 1916 when political officers introduced the Brown Trout from Europe in to Gilgit. Then the Rainbow trout was introduced in the then NWFP during 1928. In view of the great potential for further increase of trout culture, a consignment of 20,000 eyed ova of rainbow trout were imported from Japan in 1973. Later on during 1984-85 and 1986, 500,000 eggs of the Kamloop strain of rainbow trout were imported from the USA under the Pakistan First Aquaculture Development Project and a component of the project, “Pilot component on trout farming at Madyan Swat, KP” was started to demonstrate the feasibility of the Trout Farming to the Private Sector. Most of the trout seed which was raised as fry were kept in the raceways for growing to table size and some of these were stocked in various water bodies. This built a sustained population in the rivers, streams and lakes of the northern districts¹.

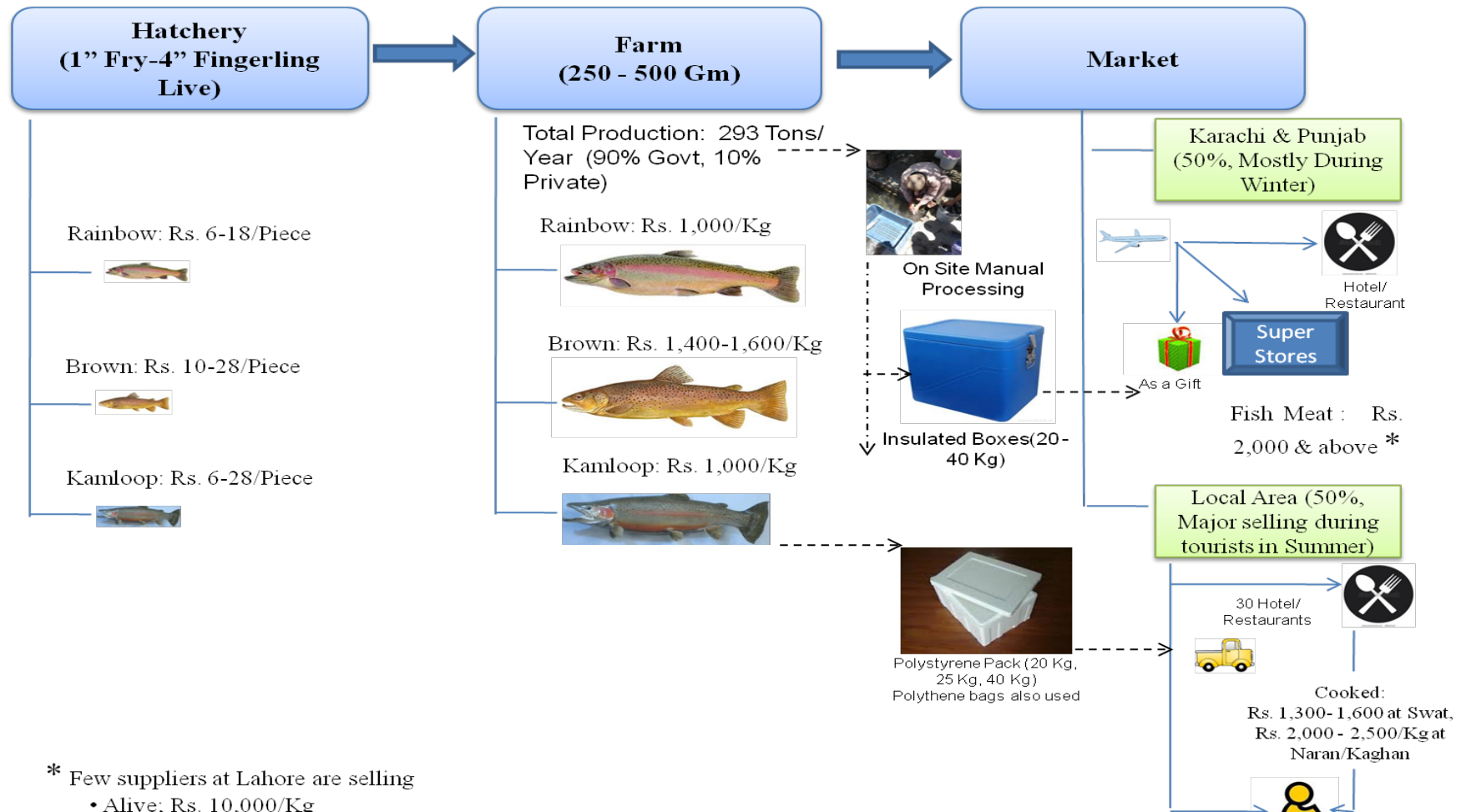
Today the specie can be found in the cold water river and streams of the northern KP as well as commercial trout farms.

2 CURRENT TROUT VALUE CHAIN IN KP

The Trout Fish Hatcheries and Farms exist in areas of KP having cold water environment. These infrastructure are built on locations which has two water sources, namely, the stream water having temperature range between 2 to 16 C°, whereas that of spring water has 10 to 14 C°. The fish raised after passing the hatchery and farms, finds its ways to the local market as well as outside KP. Sending the trout as a gift to affluent and VIPs outside the province is also a tradition of the businessmen and politicians. (Diagram on next page).

¹ Source: FAO report

2.1 The Trout Value Chain



The primary value chain component is the Trout fish hatchery. The brood mature fish lays eggs and milt once a year during the season from November to April. It takes variable days according to temperature regime between 18 to 24 days to hatch in the incubator and with a temperature range of 13 C to 14C, whereas in the conventional open trays hatching or the temperature below 13 it takes 24 to 35 days. Once coming out of the egg, the fry stays in incubator till swim up for further 10-15 days after which it is shifted to the rearing trough. The average size gain in these conventional troughs with quality trout fish feed and proper management is about 1” per month. The improved feed quality and feeding techniques may reduce this time subject to the temperature regime and management. The fry of size 1” to 4” are sold to the farms.

In the farms, the fry is kept in rearing and production raceways. The conventional farming with substandard feed results in prolonged production cycle up to 2 years. Up gradation of farms and floating feed can reduce the production cycle to 1 year. The finished product is either supplied in live form or manually processed whole fish without offal. Handling of trout fish include Packaging material and ice requirement depends upon the distance to be sent for maintainance of the quantity to be maintained for consumption.

Table 01: Packaging

Quantity	Destination	Material	Cost/Unit (Rs.)
Below 10 Kg	Local	Polythene Bags	1 to 10
	Other Cities	Water Coolers	150 to 300
10 to 20 Kg	Country wide	Polystyrene Box	350
20 Kg and Above	Country wide	Insulated Boxes	7,500

2.2 Major Players

Major players of this sector are the hatchery, farm, and Hotel, restaurants. The private sector hatcheries and farms are of medium scale requiring total investment of Rs. 2.5 to 4 Million whereas the restaurants are small scale with total investment of Rs.1 to 2 Million.

2.2.1 Hatcheries

Currently there are 18 Hatcheries, out of which 08 are government owned with a total production capacity of 1.53 Million and 10 private sector with an estimated production capacity of 6.6 Million. The hatcheries are located at Batgram, Chitral, Dir, Kohistan, Mansehra, and Swat. The total direct employment in the private sector hatcheries is 20.

Table 02: Detail of Government Hatcheries

District	Name of Hatcheries	Production Capacity (Fries)
Batagram	Batagram	130,000
Chitral	Jaghoor	120,000
Chitral	Bombret	130,000
Dir	Kalkot	100,000
Kohistan	Dubair	100,000
Mansehra	Shinu	300,000
Shangla	Alpuri	50,000
Swat	Madyan	600,000
Total		1,530,000

2.2.2 Farms

The trout fish farms are spread in the districts already mentioned in the section 1.2.1. Total number of farms is 92, all of which are private farms. The total production for the year 2015 was 292.59 Tons.² The farms detail is given below:

Table 03: Trout Fish Farms Detail

District	No. of Farms	Area in Acres	Annual Production
Swat (Madyan)	50	13.75	266.0361
Kohistan	6	1.625	0
Chitral	13	----	0.337
Mansehra	1	1	26.213
Batagram	2	0.25	0
Dir Upper	8	0.218	0
Total	92	16.843	292.5861

² Source: Directorate of Fisheries, GoKP

2.2.3 Restaurants

We may categories into three types, namely, the Four Star Hotels of major cities, local hotels, local restaurants, and restaurants with multiple food items. The detail is as under:

Table 04: Source of Supply for Hotels and Restaurants

Business	Source of Supply	Summer Sales/Business (Kg)	Winter Sales/Business (Kg)
Four star hotels	Contractor	80-100	20-30
Local hotels	Farms	80-100	20-30
Trout specific local restaurants	Own Farm	20,000-50,000	8,000-10,000
Local restaurants with multiple food items.	Farms	9,000-10,000	4,000-5,000
Retail Shop at Islamabad	Farms	-	80-100

The local hotels and restaurants experience the peak season from May to September, whereas the remaining months (winter) are of slow season.

2.3 Description of Products

The Following varieties of Trout Fish are currently being produced in the KP:

- Brown Trout: Recently introduced by private farms for its better growth and taste.
- Kamloop Rainbow Trout: Disease resistant and better growth
- Rainbow Trout: Around 80% of the farms have Rainbow due to its comparatively easy feeding and management.

2.4 Total Direct Employment Generation

Table 05: Direct Employment Detail

Business	Number Operational	Average Employment	Total Employment
Hatcheries (Both Govt.& Private)	18	03	54
Farms (Both Govt.& Private)	92	03	276
Trout Specific Restaurants	50	10	500
Total Direct Employment in Sector			830

3 SUPPORT INSTITUTIONS

3.1 Public Sector Line Departments

The directorate of Fisheries, Govt. of KP is the provincial line department having the responsibility of private sector capacity building, and providing quality trout fish seed. The department has ‘Trout Culture Training Centre at Madyan, Swat and another one is under construction at Manhsera District Head Quarter. Apart from this, the SMEDA is also working for the capacity building, support to Trout Fish Farmers Association, and market linkage of the trout fish farms.

3.2 Associations

The Trout Fish Farmers Association of Swat is active in coordination and linkages development with private and public sector stakeholders.

3.3 Donors

Department of Fisheries KP, whose capacity has been upgraded by two ADB-Aquaculture Development projects and a number of projects financed with KP’s own ADP; is disseminating trout culture technology to farmers from last four decades. Both public & private sector have received financial support in shape of grants, feed and infrastructure repair.

- The USAID firms project provided rehabilitation grants to 22 trout fish farms at Swat (October 2011 to September 2012).
- GIZ funded “Rehabilitation of Government trout fish training Center in Madyan Swat Phase II”
- An NGO “Hujra” also implemented a project “Rehabilitation & Repair of Raceways, Drains, pathways and protection spur of Madyan Trout Culture Training Centre”

3.4 Consultants

Mr. Mohammad Ayub Khan, Mr. Hayat, Mohammad Rasheed, and Mr. Umar Hayat are the prominent experts with professional background in the subject.

4 ISSUES IN THE TROUT VALUE CHAIN

4.1 The Hatchery

Starting with the basic stage of hatchery the problems are mostly associated to the capacity of the farmers in terms of lack of modern technology and improper rearing techniques from hatchery to farm supply. Mortality is the major issue with private sector hatcheries at different stages of production.

- Only five of the private hatcheries have the incubators other use the local system of trays (**Please see Annexure I**). The reliance upon open tray system in raceways increases the loss of eggs and fry due to the stress factors and diseases particularly fungal attacks. In the open system without incubators, the mortality of the eyed eggs reaches up to 75%.
- The manual grading system is not capable of grading fry, fingerlings to even sizes. Similarly the manual grading consumes time and labor intensive. The manual grading of fry increases stress factor on the stock and makes it difficult to manage for even sized fry. This leads to the cannibalization and therefore higher mortality. (**Please see Annexure II**). The main factor behind this issue is the absence of the Grading equipments. Further the hatchery operators do not have the capacity to provide mono sex eggs as they do not know the knowhow of this new technology.
- The transportation through conventional system doesn't suit the trout fry and causes losses due to stress factor. Even sometimes 100% of the fry mortality takes place due to prolonged transportation time.
- Global G.A.P. certification awareness and its certification is also lacking of these Trout Fish Farm Facilities in the Public as well as Private Sectors.

4.2 Farms

The stage of farming faces issues in common to the hatchery as well as some additional problems. These are:

- The manual grading not only causes the fish mortality but also increases the labor of grading fish for market supply. (**Please see Annexure II**)
- Though few of the fish farmers are now using pellet feed for fish but due to its transportation from Punjab and high cost of Rs. 130/Kg majority of the fish farmers rely upon the locally prepared feed. This feed quickly disintegrated in the water into the ingredients resulting in wastage of feed and contamination of water. Apparently this feed is low cost at Rs. 60/Kg but actually it is more costly than the pellet feed. The FCR of the conventional feed is 2.5 whereas the pellet feed can reduce it to 1.3. (**Please see Annexure III**).

- The finished product, that is, fish is sent to the local market via conventional transport and to the market outside KP the air cargo is utilized. The absence of dedicated mini cold storage, availability of evaporated ice. Flake ice machines and reefer vans reduces the shelf life of the product, and in case of crises, like; floods or water shortage the farmer is forced to sell the abundant fish at prices far below the actual market rate.
- Personal vendetta resulting in throwing poison to farms and thus killing all fish of a farmer.

4.3 Market

Fish is mostly consumed during the winter months within Pakistan. The common perception in Pakistan is that fish should be consumed during winters as it is good for health during this period. Summers are hot months thus it should not be consumed. The fact is that Trout Fish is fit for consumption throughout the year if its quality is maintained from farm gate to consumer.

During summer months the tourist flow is towards hilly areas where weather conditions are conducive and Trout Fish Farms are located in Pakistan. The sale of trout fish from the fish farms takes place which are marketed at the local restaurants and Hotels. The local sales coupled with sale during winter in other provinces provide opportunities to the new start up business in the sector. One study conducted few years back show that there is demand of 5000 Metric Ton of Trout Fish in the country.

There are three types of regular customers, and issues vary as per the type of the customer:

4.3.1 Restaurants and Hotels

The restaurants face following problems in common:

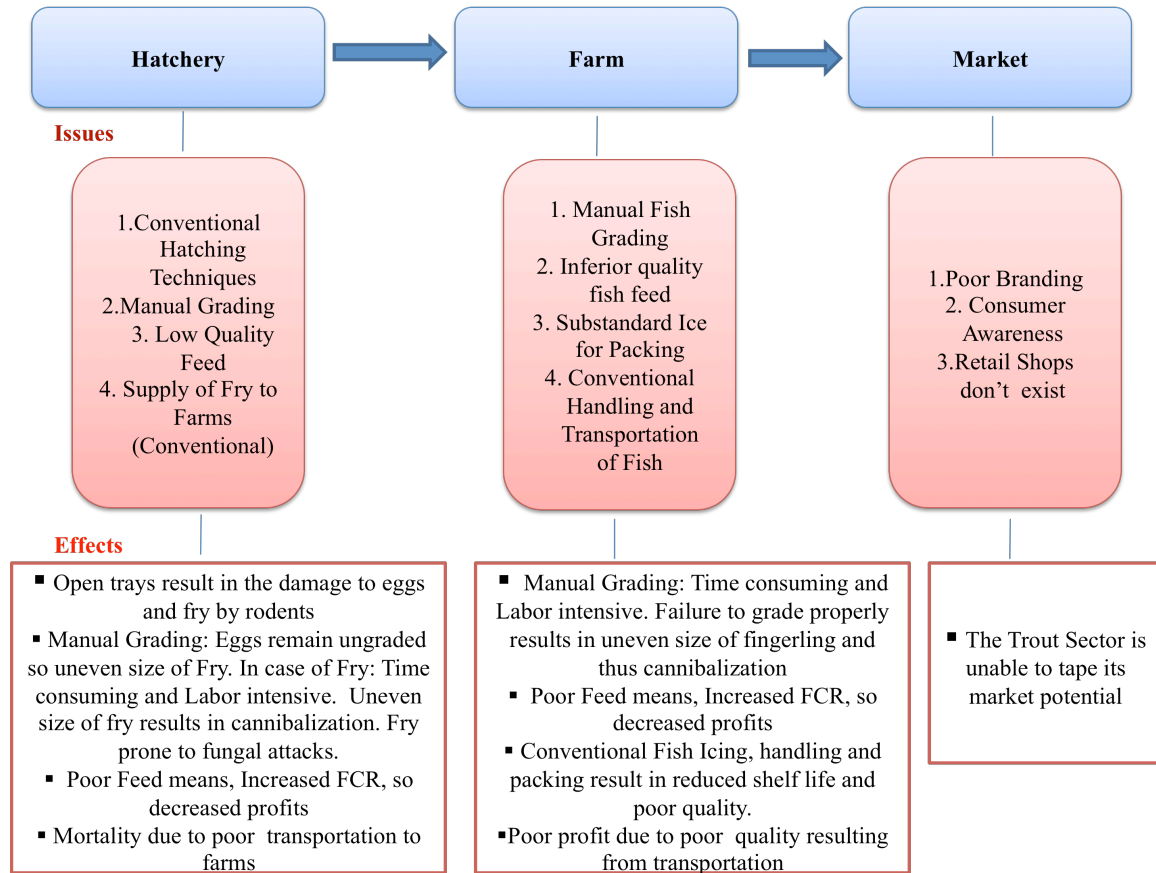
- Electricity shortfall: Unable to store the fish and therefore very limited shelf life.
- The prices are not fixed at restaurant level. The apparent loss is to those charging higher prices because the customers argue about the comparative prices but the unseen damage is actually to the entire sector by losing the customer in an unrealized way. The confused customer with shaken confidence avoids buying trout fish due to doubts about the quality and originality of the fish.

4.3.2 Super Stores

The issue of regular supply to super stores is again the absence of cold chain system. In addition to this, meeting the required continuous orders on time is also an issue for the farmers as they have limited capacity of production of trout fishh.

4.3.3 Consumers

- Local consumers buy directly from the farms, and on account of limited quantity below 20 Kg they carry the fish in polythene bags. This means compromise on quality and taste.



5 WAY FORWARD

S. No.	Intervention (Priority wise)	Impact	Nature	Responsibility
Regulatory				
	Provincial Fisheries Policy	Increase in productivity and quality	Medium Term	Provincial Govt.
	Regulatory frame for Fish and Fisheries products	Quality trout fish to the consumer	Medium Term	Provincial Govt
	Support in Import of Quality Trout Species	Increase in productivity and quality	Medium Term	Federal / Provincial Govt.
Infrastructure				
3.	General Service Roads, and Farm Access Roads	Increased Sales and Competitiveness	Medium-Long Term	NHA/Provincial Govt.
3.	Trout and Tourism Villages (Hazara, Mansehra, and Swat Regions)	Increased Tourism resulting in increased local market and increased players	Medium Term	Provincial Govt.
Technology Upgradation				
4.	Establishment of Modern Feed Mill with Pellet Feed Manufacturing (02 Mills)	Improved FCR, reduced costs, and reduced production cycle	Short- Medium Term	SMEs/Donors/Private Sector/Provincial Govt. Schemes
5.	<p>A. Modernization of Private Hatcheries</p> <p>a. Fish Egg Incubators</p> <p>b. Rearing Troughs (Fry/Fingerlings)</p> <p>c. Graders</p> <p>d. Demand Fish Feeders</p> <p>B. Modernization of Private Farms</p> <p>a. Rearing Tanks/Raceways</p> <p>b. Graders</p> <p>e. Demand Fish Feeders</p> <p>f. Aeration system</p>	<p>A. Increased productivity and profitability at hatcheries. Reduced mortality, improved quality and quantity enhancement.</p> <p>B. Increased productivity and profitability.</p>	Short-Medium Term	SME/Donors/ Provincial Govt. Schemes
6.	Productive capacity of existing public sector and technology up gradation to supply mono sex trout fish seed to commercial fish farming industry form public sector hatcheries.	Import Substitution with reduction in cost of input of Trout Fish Production	Medium Term	Donors/ Provincial Govt. Schemes

7.	Establish model fish hatchery facilities with improved proven management & latest technology	Availability of quality fry	Short-Medium Term	Provincial Govt.
8.	Cold Chain Development (In 03 Areas) A. Cold Storage B. Reefer Vans C. Flake ice machines	A. Increased Shelf life and Enhanced Quality B. Decreased mortality during transportation from hatcheries to farms, and increased shelf life for farms	Short-Medium Term	SME/Donors/ Provincial Govt. Schemes

Financial

1.	Machinery and Vehicle Leasing	Increase in productivity and quality	Medium Term	FIs and DFIs
2.	Business Loans	Do	Do	Do

Annexure I

Grinder pic?

Feed Making Machine



Annexure II



Annexure III



Annexure IV

Conventional Packaging for Small Quantities



Annexure V

Rearing Troughs



Rearing Tanks for Farms



Annexure VI

Demand Fish Feeders



Vertical Incubators



Annexure VII

Example: Trout Fish Suppliers

City: Lahore

Country: Pakistan

Contact Name: LahoriShAhZaDa

shAhZaDa Travel Guide Of Pakistan Tours

Lahore Cantt Pakistan-54810

Contact No: 92-323-4722704/ 92-3334-47-4151

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