



# PRIME MINISTER'S YOUTH BUSINESS LOAN



وعدوں سے تکمیل تک حکومت پاکستان

## Pre-Feasibility Study

### (Inland Fish Farming)



## Small and Medium Enterprises Development Authority Ministry of Industries & Production Government of Pakistan

[www.smeda.org.pk](http://www.smeda.org.pk)

#### HEAD OFFICE

4th Floor, Building No. 3, Aiwan-e-Iqbal Complex, Egerton Road,  
Lahore  
Tel: (92 42) 111 111 456, Fax: (92 42) 36304926-7  
[helpdesk@smeda.org.pk](mailto:helpdesk@smeda.org.pk)

#### REGIONAL OFFICE Punjab

3<sup>rd</sup> Floor, Building No. 3,  
Aiwan-e-Iqbal Complex,  
Egerton Road Lahore,  
Tel: (042) 111-111-456  
Fax: (042) 36304926-7  
[helpdesk.punjab@smeda.org.pk](mailto:helpdesk.punjab@smeda.org.pk)

#### REGIONAL OFFICE Sindh

5<sup>th</sup> Floor, Bahria  
Complex II, M.T. Khan Road,  
Karachi.  
Tel: (021) 111-111-456  
Fax: (021) 35610572  
[helpdesk-khi@smeda.org.pk](mailto:helpdesk-khi@smeda.org.pk)

#### REGIONAL OFFICE Khyber Pakhtunkhwa

Ground Floor  
State Life Building  
The Mall, Peshawar.  
Tel: (091) 111-111-456  
Fax: (091) 5286908  
[helpdesk-pew@smeda.org.pk](mailto:helpdesk-pew@smeda.org.pk)

#### REGIONAL OFFICE Balochistan

Bungalow No. 15-A  
Chaman Housing Scheme  
Airport Road, Quetta.  
Tel: (081) 2831623, 2831702  
Fax: (081) 2831922  
[helpdesk-qta@smeda.org.pk](mailto:helpdesk-qta@smeda.org.pk)

*Note: All SMEDA Services / information related to PM's Youth Business Loan are Free of Cost*

*December, 2013*

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**HEAD OFFICE**

4th Floor, Building No. 3, Aiwan e Iqbal, Egerton Road,  
Lahore

Tel 92 42 111 111 456, Fax 92 42 36304926-7  
[helpdesk@smeda.org.pk](mailto:helpdesk@smeda.org.pk)

**REGIONAL OFFICE PUNJAB**

3<sup>rd</sup> Floor, Building No. 3,  
Aiwan e Iqbal, Egerton Road  
Lahore,  
Tel: (042) 111-111-456  
Fax: (042)6304926-7  
[helpdesk.punjab@smeda.org.pk](mailto:helpdesk.punjab@smeda.org.pk)

**REGIONAL OFFICE SINDH**

5<sup>TH</sup> Floor, Bahria  
Complex II, M.T. Khan Road,  
Karachi.  
Tel: (021) 111-111-456  
Fax: (021) 5610572  
[helpdesk-khi@smeda.org.pk](mailto:helpdesk-khi@smeda.org.pk)

**REGIONAL OFFICE  
KPK**

Ground Floor  
State Life Building  
The Mall, Peshawar.  
Tel: (091) 9213046-47  
Fax: (091) 286908  
[helpdesk-pew@smeda.org.pk](mailto:helpdesk-pew@smeda.org.pk)

**REGIONAL OFFICE  
BALOCHISTAN**

Bungalow No. 15-A  
Chaman Housing Scheme  
Airport Road, Quetta.  
Tel: (081) 831623, 831702  
Fax: (081) 831922  
[helpdesk-qta@smeda.org.pk](mailto:helpdesk-qta@smeda.org.pk)

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## 1. DISCLAIMER

This information memorandum is to introduce the subject matter and provide a general idea and information on the said matter. Although, the material included in this document is based on data/information gathered from various reliable sources; however, it is based upon certain assumptions which may differ from case to case. The information has been provided on as is where is basis without any warranties or assertions as to the correctness or soundness thereof. Although, due care and diligence has been taken to compile this document, the contained information may vary due to any change in any of the concerned factors, and the actual results may differ substantially from the presented information. SMEDA, its employees or agents do not assume any liability for any financial or other loss resulting from this memorandum in consequence of undertaking this activity. The contained information does not preclude any further professional advice. The prospective user of this memorandum is encouraged to carry out additional diligence and gather any information which is necessary for making an informed decision, including taking professional advice from a qualified consultant/technical expert before taking any decision to act upon the information.

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## 2. PURPOSE OF THE DOCUMENT

The objective of the pre-feasibility study is primarily to facilitate potential entrepreneurs in project identification for investment. The project pre-feasibility may form the basis of an important investment decision and in order to serve this objective, the document/study covers various aspects of project concept development, start-up, and production, marketing, finance and business management.

The purpose of this document is to facilitate potential investors in **Inland Fish Farming** by providing them with a general understanding of the business with the intention of supporting potential investors in crucial investment decisions.

The need to come up with pre-feasibility reports for undocumented or minimally documented sectors attains greater imminence as the research that precedes such reports reveal certain thumb rules; best practices developed by existing enterprises by trial and error, and certain industrial norms that become a guiding source regarding various aspects of business set-up and it's successful management.

Apart from carefully studying the whole document one must consider critical aspects provided later on, which form basis of any Investment Decision.

### 3. INTRODUCTION TO SMEDA

The Small and Medium Enterprises Development Authority (SMEDA) was established in October 1998 with an objective to provide fresh impetus to the economy through development of Small and Medium Enterprises (SMEs).

With a mission "to assist in employment generation and value addition to the national income, through development of the SME sector, by helping increase the number, scale and competitiveness of SMEs" , SMEDA has carried out 'sectoral research' to identify policy, access to finance, business development services, strategic initiatives and institutional collaboration and networking initiatives.

Preparation and dissemination of prefeasibility studies in key areas of investment has been a successful hallmark of SME facilitation by SMEDA.

Concurrent to the prefeasibility studies, a broad spectrum of business development services is also offered to the SMEs by SMEDA. These services include identification of experts and consultants and delivery of need based capacity building programs of different types in addition to business guidance through help desk services.

### 4. INTRODUCTION TO SCHEME

Prime Minister's 'Small Business Loans Scheme', for young entrepreneurs, with an allocated budget of Rs. 5.0 Billion for the year 2013-14, is designed to provide subsidised financing at 8% mark-up per annum for one hundred thousand (100,000) beneficiaries, through designated financial institutions, initially through National Bank of Pakistan (NBP) and First Women Bank Ltd. (FWBL).

Small business loans with tenure upto 8 years, and a debt: equity of 90: 10 will be disbursed to SME beneficiaries across Pakistan, covering; Punjab, Sindh, Khyber Pakhtunkhwah, Balochistan, Gilgit Baltistan, Azad Jammu & Kashmir and Federally Administered Tribal Areas (FATA).

SMEDA has been tasked with an advisory role in the implementation of PM's scheme by providing fifty (56) updated pre-feasibilities for referencing by SME beneficiaries and participating banks to optimally utilize their financial resources.

### 5. EXECUTIVE SUMMARY

**Inland Fish Farming** is proposed to be located primarily in warm areas of Pakistan having a water temperature range of 20 - 35 degree centigrade. It is suggested that the farms may be established in any part of the country if the available land meets the criteria of pond construction with availability of abundant quality water.

Fish is a nutritious product, widely consumed around the world in varieties of food items. They are used in various traditional dishes such as Amritsari Fish, Tandoori Fish, Fish Tikka and Fish Pakora etc. and also consumed in modern dishes like burgers, pizzas and canned products. In addition, fish are also used in medicine and animal feed industry. Such factors contribute to making fish farming a viable project for investment

Though fish farm can be planned and started with one acre of land area but the minimum economical unit is of 8 acre. As pond fish culture is preferred and most convenient way of fish culture under prevailing conditions, land with at least 40 % clay content and less than 20% sand is appropriate to start a fish farm due to its acceptable water retention capability. Grass carp, silver carp, rohu, morkahi, bighead carp and Catla are cultured in warm areas of the country, whereas mahseer in hilly areas, and trout in cold regions.

All these species can be cultured in the temperature range of 20-35 degree centigrade. The project would start operations at project capacity of 10,117 fish of different species at year 01. Total Cost Estimates is **Rs. 2.08 Million** with fixed investment of **Rs. 1.72 Million** and working capital of **Rs. 0.36 Million**. Given the cost assumptions, Project Internal Rate of Return (IRR) and payback are **34 %** and **3.6 years** respectively.

## 6. BRIEF DESCRIPTION OF PROJECT & PRODUCT

Following key parameters must be addressed in this pre-feasibility study;

- **Techniques:** Intensive fish farming technique is suggested for the proposed project.
- **Location:** The project would be located in areas such as Sibi, Naseerabad, Jaffarabad in Balochistan, Mandi Bahauddin, Sialkot, Bahawalnagar in Punjab, Thatta in Sindh and similar warm areas that provide suitable environment and particularly water temperature range between 5-35 degree centigrade.
- **Product:** The main product is fish which is nutritious and protein rich product widely consumed around the world in varieties of food items.
- **Target Market:** Major cities e.g Quetta, Karachi, Lahore, Faisalabad, Multan, Bahawalpur and Islamabad, are target markets for fish. Also, there is an enormous export market to Middle East countries.
- **Employment Generation:** The proposed project will provide direct employment to 3 people.

## 7. CRITICAL FACTORS

The commercial viability of the proposed project depends on the following factors;

- Selection of proper location with water, equipment and trained staff would facilitate the project to run successfully.
- Farm should have enough elevation so it can easily be dried out during off season.
- It should be positioned away from agricultural activities to avoid spray application of pesticides.
- Healthy certified seed must be purchased from certified dealers for the assurance of desired fish species.
- To attract larger number of customers, the product must be processed on basic quality standards.
- Each farm should maintain a written health and welfare program for elimination of diseases and quality production.
- Whole sale distribution and marketing of final product.

## 8. INSTALLED & OPERATIONAL CAPACITIES

The project would start operations with a project capacity 10,117 fish of different species and different age for first 9 months cycle. The proposed fish species for the said project are Thaila, Moraka and Rohu. These species provide an ideal environment for fish farm management due to their specific feeding patterns. Rohu feeds near the water surface, Thaila in the middle and Moraka takes feeds from the bottom. This pattern will provide an efficient utilization of feeds and prevent feed losses. It is the choice of entrepreneur; however it is recommended that these species may be used in ratio of Rohu (40%), Thaila (30%) and Moraka (30%) respectively.

## 9. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

The proposed location for the establishment of the fish farms will primarily be warm areas that provide suitable environment and particularly water temperature range of 5-35 degree centigrade. It is suggested that the farms may be established in Mandi Bahauddin, Sialkot, Bahawalnagar, Vehari, Jhang, Muzaffargah, Gujranwala, Thatta, Badin, Dadu, Sibi, Naseerabad, Jaffarabad, Lasbela, D I Khan, Kohat, Mardan, Abbotabad etc.

The marketing of fish follows the traditional channels of distribution. Generally fish are distributed in the market through middlemen and wholesalers. The role of middlemen and wholesalers is to identify buyers and negotiate the price. Fish are transported to the urban market and are sold to retailers. The time spent in getting fish from the farm to the

retail shop varies from area to area. Although collection and handling of fish has improved with the use of loader vehicles, but it is an established fact that greater the distance between the farm and consumer, more complicated will be marketing system including their collection, handling and transportation to the middlemen or consumer as per perishable nature of the product. The trick in marketing is availability of current market information of fish supply and demand, which will determine the selling price.

## **10. POTENTIAL TARGET MARKETS/ CITIES**

The target customers for fish are households, hotels, restaurants, traders, retailers, wholesalers, processors and exporters. Fish production, trade and utilization in the world has been increasing dramatically fast due to the prevalence of huge demand. In addition to major cities e.g. Quetta, Karachi, Lahore, Faisalabad, Multan, Bahawalpur and Islamabad, there is an enormous export market to Middle East countries.

## **11. PRODUCTION PROCESS FLOW**

The overall production cycle for the inland fish farming comprises of 8-9 months which is mainly subjected to the life/age of the seed (specie). If fresh seed is used (with an age of less than 20 days) the production cycle will take 9 months for the production of desire output. It varies respectively with the selection of fish (seed) age. Keeping in view the economical prospective, it is suggested that fish with different age may be used for different ponds.

### **11.1 Site Selection**

Special consideration should be given to the location of proposed facility. It should be located in an area that is neither subject to flooding nor near to rivers. The selected location should have enough elevation so that it can easily be dried in off season. In addition, many other factors must be considered while selecting site. These factors may include availability of china clay in soil, round the year adequate water supply, road access even during the rainy season and location away from agricultural activities to avoid pesticides application and noise pollution.

### **11.2 Structural Design of the Land**

The site for proposed fish farm will require proper surveying to determine the slope, bed of pond should be kept slight in slope to take advantage by allowing the water to flow as much as possible by gravity. This slope will provide water to move easily hence increase the natural oxygenation process and reduce the soil excavation due to water strike which ultimately results in the lowering of operational costs.



Water distribution channels should be placed on top of the pond dikes and the drainage channels from the ponds should be kept at the lowest point of the land. Effort should be made to utilize the natural attributes of the land to minimize capital costs and to facilitate the operational efficiency.

### **11.3 Soil Sampling**

Soil samples should be taken in account of the proposed site for analysis. These samples should be collected from the surface, middle and depth. The required lab tests are pH, soil composition (the ratio of sand to silt to clay), total dissolved salts, calcium and magnesium etc. Clay is most desirable for water retention in the fish ponds. If the soil is sandy at the surface but contains sufficient clay at an accessible depth, the sandy soil should be excavated completely, and the clay will be used for the final layers of the pond bottom and pond banks to minimize water losses.

### **11.4 Pond**

The most appropriate pond type is the combination of both excavated/elevated ponds. If the soil has sufficient clay content, the dikes can be built from the soil that is removed during pond excavation, thus excavation costs are minimized. Elevated ponds are recommended for natural oxygenation and could be partially drained by gravity. The proposed project will be established on 8 acres of land, consisting of 7 ponds with an area of 1 acre per pond. Appropriate walkways must be designed between ponds for ease of management. Preferably a rectangular shaped pond is desirable. It should be constructed by excavation 2 to 3 feet soil and elevating for 4 to 5 feet from ground level. The crest of the embankment should be 4 to 5 feet and depth should not be more than 8 to 10 feet, having a minimum slope of 1 to 2 feet.

### **11.5 Water Requirement**

Water is the most essential component of inland fish farming. Normally two sources of water are preferred i.e. tube well and Irrigation canal water. Irrigation water comes from the entire catchments area of the drainage, thus it carries high loads of silt, and is subject to change in environmental conditions and water quality ( temperature changes, rainfall silt loadings, alkali salt runoff, etc.) it may also carry a large number of trash/ carnivorous fish. In case of selecting irrigation water, proper filtration method must be used for obtaining the desire quality.

The water quality of the tube well should be analyzed, oxygenation is main problem with the tube well water, and arrangement must be made for oxygenation of water that can be accomplished by installing air blowers. Thus temperature and dissolved oxygen should be tested at the site. A sample should be taken in one liter bottle capable of

being sealed and transported immediately to a lab for further examination analysis, tests of the total alkalinity, pH, nitrogen, salinity and total dissolved solids are required.

The key water quality parameters for pond production are temperature, oxygen, pH, alkalinity, hardness and nitrogenous wastes.

**Dissolved Oxygen:** Oxygen levels higher than 5 mg/L are good for eggs, larvae, fry and fingerlings. When dissolved oxygen levels are low, fish start gulping air at water surface. Even adult fish will perform better when the dissolved oxygen levels are adequate. Oxygen levels of 0 – 1.5 mg/L can be lethal especially if exposed for long periods. At 1.4 – 5 mg/L-fish survive, but reduced feed intake, higher FCRs, slow growth, stress, and increased susceptibility to disease has been observed. Gas bubble trauma occurs when the water is supersaturated to levels of 300% and above. During day, oxygen deficiency may not be problem in well fertilized ponds due to oxygen production from phytoplanktons and water perturbations but problem may occur when this process reverses at night so some sort of artificial aeration will be required during night or even during day if stocking densities are high. Daily monitoring of oxygen especially during hot and humid days is very important.

**Temperature:** Fish are cold blooded animals. Their rate of metabolism is directly influenced by water temperature. Rate of breaking down of wastes in pond and dissolution of chemicals is faster in warmer waters. Temperatures at 26 °C or higher affects solubility of oxygen in water. If the temperature is below 20 °C there is reduced feed intake which stops growth. At lower or higher temperatures than optimum, feed intake is lower and FCRs are higher. At extreme temperatures fish is more susceptible to disease and sometimes death ensues.

**Water pH Level:** It affects the solubility and chemical forms of various compounds. The pH range from 6.5 to 9 is acceptable, below 4 is called 'Acid Death Point'. Fish can survive from 4 – 6.0 but remain stressed, growth is slow, there is reduced feed intake and FCRs are higher. Low pH indicates high levels of dissolved carbon-dioxide, hence, pH values from 9 – 11 are stressful for fish and considerably reduces growth rate. The pH value above 11 is 'Alkaline Death Point'.

**Alkalinity and Hardness:** In combination, alkalinity and water hardness influence the buffering capacity of the pond water. Hardness is composed mostly of calcium and magnesium, which affect the physiological condition of the fish. Alkalinity also controls the amount and form of carbon-dioxide in water. Alkalinity > 20 ppm, hardness > 20 ppm, total alkalinity and total hardness above 60 ppm is desirable. Well buffered water will minimize diurnal fluctuations in pH.

**Ammonia Nitrogen (TAN):** Ammonia occurs in both toxic (ammonia) and nontoxic form (ammonium) depending on the pH of the water. Toxic ammonia more than 0.3-0.5 is not acceptable. The proportion of TAN in the form of ammonia tends to be higher as the pH of the water increases above 7. The fish become susceptible to pathogenic attacks and fail to eliminate ammonia from their blood because there is too much ammonia already in the water. Ammonia is excreted by fish as a byproduct of protein metabolism primarily through their gills. High concentrations of ammonia in water reduce the ability of the gills to do so.

**Organic Loading:** When organic matter is added into ponds, it results into an increased demand for the available dissolved oxygen and an increased likelihood of pollution. The likelihood and degree to which pollution might occur becomes reduced if the organic matter added can be broken down into smaller, less complex particles that are less toxic. Oxygen and bacteria are required for the effective break-down and assimilation of organic matter. Controlling input levels of organic matter is a pre-requisite for managing dissolved oxygen levels as well as other water quality parameters within the pond. Once feed has been fed to the fish in a pond, the excess feed cannot be removed. It drops to the bottom of the pond as organic matter. Accumulated wasted feed, subsequently results into pollution instead. Feeding fish by response is one way of ensuring that the fish are only fed what they can consume.

**Water Exchange:** There are reasons to exchange water in specific instances, notably, to flush out excessive nutrients and plankton and to reduce ammonia concentrations. Daily water exchange usually does not improve water quality in ponds because water temperatures and dissolved oxygen levels in inflowing water are lower than those in 'static water' ponds that have not yet attained their carrying capacity. Pumping costs are also a liability. Ponds are highly efficient in assimilating carbon, nitrogen, and phosphorus inputs not converted to fish flesh, but if water exchange is great, phytoplankton is reduced and these nutrients are discharged from ponds before they can be assimilated. In well fertilized ponds and with high stocking density water exchange is highly important and useful too.

**Turbidity:** Turbidity is a measure of transparency of water in the pond. The color of the water gives an indication of what sort of turbidity it is. If it is brown it is often due to clay and if it is greenish, it is due to plankton. Make sure that water is light green. Dark green or brown color water is not good for successful fish culture.

## 11.6 Fish Species

In semi-intensive culture, practised under controlled conditions of aeration and water exchange, following fish species with stocking density of 1250 to 2500 fish per acre are used in inland fish farm;

- Rohu is the major stocking species in this poly culture system and is 40% of the total stock. It is column feeder.
- Catla or Thaila fish stays on water surface and is phytoplankton feeder and is 30% of the total stock.
- Moraka is bottom feeder and is 30% the maximum of the total stock.

## 11.7 Farm Fixtures

Fish farms must be furnished with proper electricity facilitation for daily routine operations and particularly for the management of water and air. In addition, for quality inland farming machinery like filter, air & water pumps and blower must be installed.

## 11.8 Fertilizers

Fertilization of ponds increases the amount of nutrients available for primary production. Organic and inorganic fertilizers contain nutrients necessary for plant growth. By increasing the production of phytoplankton (the base of the food web), production of other pond organisms also increases. These pond organisms are available food for juvenile fish and crustaceans. There is a direct correlation between phytoplankton production and fish production in fertilized ponds. When the cultured species are in the juvenile stages, increasing primary production with fertilization reduces the need for more expensive supplemental feeds. Two types of fertilizers can be used i.e. organic and inorganic. Inorganic fertilizers are either granular or liquid and can contain a combination of nitrogen (N), phosphorous (P), and potassium (K). Animal manures and vegetation materials are commonly used as organic fertilizers. In agriculture, fertilizer rates for specific crops such as corn or wheat are established by soil testing. This is a well-established procedure for agriculture crops, but fertilizer rates cannot be formulated for individual ponds. A fertilization regime that has been effective in fish ponds can be used to increase production. After filling the pond and prior to stocking, apply 20-20-5 chemical fertilizer at a rate of 22 kg/acre. Follow with two more applications in two-week intervals. Continue fertilizer application at the same rate every two to four weeks. Since, water exchange flushes nutrients and phytoplankton from ponds, these ponds may have to be fertilized more frequently. Feeding will add additional nutrients to ponds, possibly reducing the need for continued fertilizer application. When using liquid fertilizers, dilute with water (1:10) and apply around pond edges. In larger ponds liquid fertilizer can be applied throughout the pond with the use of a boat. This fertilization program was developed for low alkalinity freshwater ponds. It cannot be assumed that this standard procedure would be ideal under all circumstances. Farmers may have to generate specific fertilizer procedures for each individual pond.

## 11.9 Fish Growth

Growth is defined as weight gain during a specific period of time. Fish are cold blooded creatures and their metabolic rate is governed directly by the ambient water temperature. The optimum growth of fish occurs at approximate temperature range of 20 to 35 degree centigrade. At higher temperature than this, a thermal stress occurs, resulting in an excessive metabolic rate, reduced growth, increased oxygen consumption, and greater susceptibility to diseases. If temperature is significantly high than 35 degree centigrade then recommended management strategy should be add fresh water to the pond to reduce water temperature. Growth monitoring of all species are required at intervals of thirty days before final harvest. The desired final product for all species is a minimum of 1.5 kg at harvest.

### 11.10 Feeding

The fundamental objective of feeding fish is to get maximum growth, optimum yield, good health, ultimately optimizing profits which are impossible without the provision of quality feed in sufficient quantities. Presently commercial fishes are cultured at both natural and artificial feeds so feeding methods differ and are adapted according to the particular fish species requirements. Since natural feed is cultured in pond before introduction of fish and /or after stocking to cater its daily requirements, hence, feed once produced is not stored and is fed to fish immediately otherwise it will lose its palatability and nutritional efficacy. Artificial feeds, however, sometimes supplement the existing natural feed or sometimes work alone to cater all the nutritional requirements of fish. Pelleted floating artificial feed is always preferable with few exceptions. Concentration of protein in feed decreases with increase in fish size; higher protein percentage is required for smaller fish while lower for bigger fish. Proper pelleting of feed is of key importance for ideal water quality, maximum output with minimum pollution. Nutrient requirements and feed formula can also vary in different environments and according to the availability of feed ingredients. In a well managed pond enough food will be produced to permit the moraka, rohu and thaila to attain marketable size in a prescribed growth period. All species will accept supplementary feeds and additional weight gain may be realized, but the bottom and water column feeding species (Rohu and Moraka) may receive the most benefits, especially if the amount of organic material in the pond is limited. Four rules should be followed while feeding fish;

- 1) A regular feeding schedule should be followed as infrequent feeding will have little measurable effect on growth. The fish should be fed on daily basis during the warm months.
- 2) The quantity of feed given must be calculated based on the actual sample weight data collected at the end of each month,
- 3) The fish must be fed at the same time each day, and at the same place in the pond. The fish will quickly become accustomed for feeding and will often move to the feeding area as soon as the farmer appears at the edge of the pond. This practice avoids wastage of feed.
- 4) The farmer must carefully observe feeding behavior and determine the extent to which the fish are consuming the feed given.

Supplementary feeds and feed mixtures must be fresh as it quickly disperse and become unavailable to the fish. The fish should be fed slowly, and the farmer must stop feeding when there is no feeding activity especially in cloudy/ rainy days and when temperature is too high or too low.

**When Not to Feed Fish:** If the fish is showing poor feeding response, or it is not feeling well, or you are planning to harvest fish for sale for sampling or when you are treating pond or when temperature is too high or too low do not feed fish.

### 11.11 Fish Diseases and Losses

The tremendous growth in fish farming activity in Pakistan has highlighted various issues of fish husbandry including fish diseases and their control. The problems of fish diseases are related to stocking density, level of aquaculture technology applied and inputs going into the fish ponds. In fish farms, the fish are densely stocked and thus are more susceptible to different diseases. Uncontrolled and unregulated transport of fish and poor farm management is also considered as cause of spread of disease. Disease causes mortality, poor growth, loss of fecundity and minimize production.

Fish are affected by viral, bacterial, fungal and parasitic diseases/ infections. Moreover, poor water quality in fish ponds also put fish under stress which can leads to fish mortality. In ponds fish are also under stress of predation by some predators at the early age. The description of some commonly occurring fish diseases, predators and their control is given as under;

#### I. Viral Diseases

- **Viral Haemorrhagic Septicaemia:** It is an infectious disease caused by coldwater rhabdovirus. Fish may be lethargic and congregate at tank/ponds sides or outlets, have pale gills, dark body color, and exophthalmos and in some cases intermittent periods of erratic spiraling swimming. Haemorrhage may be visible in the eyes and skin, within the muscle and internally in the viscera and intestine. In more chronic cases some of the above signs may be obvious with abdominal distension due to oedema in visceral organs. Disinfection and quarantine is the most effective means of controlling epidemics. Iodophore treatment will readily eliminate the virus from eggs of carriers, making it reasonably certain that progeny will be free of this disease.
- **Spring Viraemia of Carp (SVC):** It is an acute haemorrhagic and contagious viral infection specifically of the common carp. The disease usually erupts in spring and causes mortality of the adults as well as the young stock. Viral outbreaks are often complicated with secondary bacterial infections. The signs of disease are; lethargy, distended abdomen, petechiation on gills, skin and around eyes, oedematous vent and trailing mucoid casts, exophthalmia and internally ascites with focal haemorrhages in swim bladder and other visceral organs. Still there is no known treatment.

## II. Bacterial Diseases

- **Mycobacteriosis:** It is chronic progressive disease caused by certain Mycobacterium bacterial species. Many of these bacteria occur naturally in the aquatic environment. Contaminated feed (based on uncooked trash fish) is a common source. There is no fully effective treatment, therefore, the best course is to cull the diseased fish and disinfect premises with 10,000 ppm chlorine or 60 – 85% alcohol. Erythromycin, rifampicin, and streptomycin is effective against experimental infections. Kanamycin may be effective in some cases. Gloves should be worn when handling suspect or infected fish or when cleaning contaminated surfaces.
- **Abdominal Dropsy:** It is a disease of pond fishes. Distended belly and oozing out of white or yellow exudates, erected scales and abnormal swimming are the common symptoms of this disease. Use of antibiotics can obviate the problem. Oxytetracycline, chloramphenicol, and nifurpirinol have successfully controlled some outbreaks.
- **Fin Rot:** It is another bacterial disease which is very common in polluted pond environment. Bloody patches at the base of the fin and gradual erosion of fins are common symptoms. Regular baths in copper sulphate and potassium permanganate can cure the disease. Oral administration of antibiotics can be helpful in controlling the disease.
- **Gill Rot:** It damages the gills. The gills which normally secrete excessive mucous become firmly glued with each other and hardly separate and open during breathing. Fish feel difficulty in breathing and expire if the situation intensifies. Maintenance of pollution free pond environment is of extreme importance. Disinfection of pond can help. Baths in copper sulfate solution or potassium permanganate can relief the condition. Administration of oxytetracycline and chloramphenicol can successfully control if disease outbreaks.
- **Furunculosis:** Furunculosis is a fatal disease caused by the bacteria. High mortalities, without external signs of infection are often associated with acute furunculosis, although anorexia may be present. Other fish may appear dark in colour, lethargic with reddening at the fin bases or head. Internally there may be widespread petechiae in the viscera and a swollen spleen. The haemorrhagic lesions may be present in the musculature with bloody discharge from the vent. Broad spectrum antibiotics are effective in controlling an outbreak, but increasing antibiotic resistance is observed and sensitivity should be tested. Nevertheless

oxytetracycline, furazolidone, oxolinic acid and potentiated sulfonamides have been used successfully.

- **Bacterial Gill Disease:** Bacterial gill disease is an important disease in gill tissue. Gill is the only target organ and clinical signs include lethargy, dyspnea, coughing and flared opercula. Early cases of this disease can be treated by prolonged baths in potassium permanganate and copper sulfate, however, advanced cases demand systemic antibiotics. Providing adequate oxygen is useful supportive therapy.

### III. Fungal Diseases

- **Saprolegniosis:** It is infections in fish and fish eggs associated with the water moulds and fungi. Lesions are focal, grey-white patches on the skin or gills of fish which, when examined underwater have a cotton-wool-like appearance. Gills, mouth or bronchial cavity can also be affected. Internal infections in the peritoneum or gastrointestinal tract in younger fry can also be seen and results in high mortalities. Freshwater fish eggs are also very prone to infection. Overcrowding and poor water quality may also give rise to infection. Affected fish are difficult to treat although formalin, formalin with bronopol (Pyceze) and salt as bath treatments show some benefit. Liquid paraffin in the feed is of benefit for fry which have fungal infections in the gastrointestinal tract. There is no protective vaccine and no effective treatment. To minimize fish losses in infected ponds water, exchange should be stopped and lime or hydrated lime and/or salt be applied. Malachite green is the most effective drug but is not approved due to human health concerns.

### IV. Parasites (Amoebic and protozoan infections)

- **Costiasis:** It is the infection of fish caused by costia, a protozoan parasite of skin and gills. Mortality in fry, flashing, thickened mucus on skin giving an opaque blue-grey appearance to body. Respiratory distress and mortality with gill infestation, epidermal or epithelial (gill) necrosis and sloughing are common symptoms of this disease. Formalin baths or flush treatments are effective. Salt may also help as a bath in some cases. Improving the tank or pen environment will usually help the situation with regard to any parasite infestation.
- **Amoebic Gill Disease:** It is a significant disease which results in respiratory distress and mortality. The parasite can survive in the water and maintain its infectivity for at least 14 days. The most effective and frequently used treatment is freshwater baths. Briefly fish are bathed in freshwater close to zero salinity for 2 to 6



hours. Salt, formalin and Virkon flowing treatments all appear to help to control the parasite, although moving fish from severely affected tanks to clean tanks is also of benefit. Control by monitoring and early, accelerated harvest with rapid processing can be practiced if present.

- **Gyrodactylosis:** Diseased fish are lethargic and are found in slower moving water. Affected fish can act as carriers of the parasite and the parasite has spread between rivers and farms mainly by restocking and transport of live fish.
- **Lernaeosis** is the most prevalent disease among all the carps including all the stages of development. Fish feels restless, common red patches are visible on fish body and it dies if intensity of parasite exceeds certain limits. Organophosphate is usually effective, prolonged immersion treatment should be repeated every 7 days for 28 days. Diflubenzuron is less toxic to fish and is highly effective.

## V. Anoxia

Depletion of oxygen in fish pond is called anoxia. This condition may be due to rise in water temperature in pond, over stocking of fish seed and other biological factors. In anoxia condition, fish come on the surface of water, stop feeding and show restlessness. The Anoxia condition in pond can be improved by addition of fresh water and agitating pond water.

## VI. Fish Predators

There are some predators which prey on fish from fry to adult stage which include water insects, amphibians, reptiles, birds, carnivorous fish and even mammals. Harmful insects include water beetle, water bugs, water scorpion etc. which attack fish eggs and fry, but can be controlled by improvement in fish pond management.

Frogs and toads are also predators but the best way to control them is to eliminate the breeding grounds of these amphibians. Reptiles such as tortoises and snakes also prey on fish and can be controlled by netting them out of pond and destroying them.

Aquatic birds like king fisher, fishing eagle, Heron prey on small and big fish and can be controlled by shooting. The presence of carnivorous fish such as *Mystus*, *Wallago* and *Channa* species in pond also affects farm productivity. These prey fish may enter the farm through canal water or by stocking unidentified fish seed from natural waters. These unwanted fish can be eradicated by use of rotenone and even installing fine screens at water inlet.

Water rats and otter eat fish, eggs, fry and big fish. These animals even destroy fish feed. These predators can be controlled by fixing fences around the ponds and catching them in traps.

## 12. Project Cost Summary

A detailed financial model has been developed to analyze the commercial viability of Inland Fish Farming under the Prime Minister's Small Business Loan Scheme. Various cost and revenue related assumptions along with results of the analysis are outlined in this section.

The projected Income Statement, Cash Flow Statement and Balance Sheet are attached as appendix.

### 12.1 Project Economics

All the figures in this financial model have been calculated for 14,000 units of fish for approximately 7 acres of land. The following table shows internal rates of return and payback period.

**Table 1 - Project Economics**

Description	Details
Internal Rate of Return (IRR)	34%
Payback Period (yrs)	3.6
Net Present Value (NPV)	5,122,157

Factors that influence the profitability of Inland Fish Farm are farm management selection of fish seed, proper feeding and care of oxygen in ponds.

### 12.2 Project Financing

Following table provides details of the equity required and variables related to bank loan;

**Table2: Project Financing**

Description	Details
Total Equity (10%)	Rs. 208,601
Bank Loan (90 %)	Rs. 1,877,406
Markup to the Borrower (%age/annum)	8%
Tenure of the Loan (Years)	8

### 12.3 Project Cost

Following requirements have been identified for operations of the proposed business.

**Table 3: Capital Investment for the Project**

Capital Investment	Amounts (Rs.)
Ponds / Infrastructure	1,069,882
Machinery & Equipment	350,000
Office Equipment	5,000
Pre Operating Cost	301,973
<b>Total Fixed Capital</b>	<b>1,726,855</b>
Equipment Spare part inventory	21,077
Raw Material Inventory	27,300
Upfront Land Lease Rental	210,775
Cash	100,000
<b>Total Working Capital</b>	<b>359,152</b>
<b>Total Project Cost</b>	<b>2,086,007</b>

### 12.4 Space Requirement

Total area required for the Inland Fish Farming is 7.03 acres of land that comprises of 7 pond, office building, guards room and open space.

**Table 4: Space Requirement**

Description	Cost Per Unit (Rs.)	Area in Sq. ft	Total Cost (Rs.)
Office Building	600	500	300,000
Construction of Seven (7) Fish Ponds	304,921	2	609,842
Warehouse	500	625	312,500
<b>Total</b>			<b>1,222,342</b>

## 12.5 Machinery and Equipment

Following table provides list of machinery and equipment required for Inland fish farm.

**Table 5: List of Machinery and Equipment**

Description	No	Total Price (Rs.)
Net	1	150,000
Filter	2	40,000
Water Pumps	3	60,000
Fitting & Misc	1	100,000
<b>Total</b>		<b>350,000</b>

## 12.6 Human Resource Requirement

**Table 7: Human Resource Requirement**

Description	No. of Employees	Monthly Salary (Rs.)	Total Monthly Salary (Rs.)
CEO / Manager	01	20,000	20,000
Feeders	01	12,000	12,000
Security Guards	02	12,000	24,000

**Note:** The staff salaries are estimated according to the market trends; however, the investor may set different pay scales.

The table above provides details of human resource required to manage fish farm. The human resource requirement may vary from area to area.

## 12.7 Revenue Generation

Final product of the fish farm is fish ready to sell in market that would generate total revenue. The capacity of farm is 1,500 units per acre of fish for first year, however, at 20% mortality rate, total number of recovered fish units are 10,117 in first year of production. The average farm gate selling price of fish is Rs. 200 per kg.

**Table 8: Revenue Generation**

Product	Unit	Sales Price (Rs./Unit)	First Year Production	First Year Sales Revenue (Rs)
Fish (having 1.5 kg live weight)	No.	200	10,117	2,023,438
<b>Total Sales Revenue</b>				<b>2,023,438</b>

**13. CONTACTS of SUPPLIERS AND CONSULTANTS**

Prof. Dr. Muhammad Ashraf Dean/ Chairman, Dept. of Fisheries and Aquaculture, University of Veterinary and Animal Sciences, Out Fall Road, Lahore Ph: 042-99213510, 049-4422102 (Ravi Campus Pattoki), Cell No. 0300-7627688	CEO Fisheries Development Board (FDB) Plot #12, Orchard Scheme, Murree Road Islamabad Phone: 051- 923 0348-9 Fax: 051-8365937
Dr. Abdul Rab Program Leader/ PSO Aquaculture and Fisheries Program National Agricultural Research Centre Park Road, Islamabad Tel: 051 9255061, 051 9255012	Director General Department of Fisheries Govt. of Balochistan, Quetta Ph: 081-9211587
Muhammad Ashraf Director General Fisheries Department of Fisheries, Government of Punjab, 2- Sanda Road Lahore Ph: 042-99212374-75 & 79	Mr. Junaid Watoo Company Secretary Fisheries Development Board (FDB) Plot #12, Orchard Scheme, Murree Road Islamabad, Phone: 051-923 0348-9, Fax: 051-8365937
Mr. Abid Hussain M/s. Abid Rafique and Co. (Aquaculture fingerlings, equipments, consultancy) Cell: 0300-5260128, www.abidrafique.com	

## 14. Financial Analysis

### 14.1 Profit and Loss statement

Statement Summaries										SMEDA
Income Statement										Rs. in actuals
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	2,023,438	2,225,782	2,448,360	2,693,196	2,962,516	3,258,767	3,584,644	3,943,108	4,337,419	4,771,161
Cost of goods sold	582,889	630,464	682,047	737,984	798,655	864,472	935,885	1,013,383	1,097,499	1,188,817
Gross Profit	1,440,549	1,595,318	1,766,313	1,955,212	2,163,861	2,394,295	2,648,759	2,929,726	3,239,920	3,582,344
<i>General administration &amp; selling expenses</i>										
Administration expense	543,840	596,789	654,893	718,655	788,624	865,405	949,662	1,042,123	1,143,585	1,254,927
Travelling & Comm. expense (phone, fax, etc.)	58,080	63,735	69,940	76,750	84,222	92,422	101,420	111,295	122,130	134,021
Office vehicles running expense	-	-	-	-	-	-	-	-	-	-
Office expenses (stationary, etc.)	2,640	2,897	3,179	3,489	3,828	4,201	4,610	5,059	5,551	6,092
Depreciation expense	88,994	88,994	88,994	88,994	88,994	88,994	88,994	88,994	88,994	88,994
Amortization expense	60,395	60,395	60,395	60,395	60,395	-	-	-	-	-
Property tax expense	-	-	-	-	-	-	-	-	-	-
Miscellaneous expense	110,117	121,129	133,242	146,566	161,223	177,345	195,079	214,587	236,046	259,651
Subtotal	1,074,841	1,144,713	1,221,418	1,305,622	1,398,060	1,439,142	1,550,541	1,672,833	1,807,082	1,954,459
Operating Income	365,708	450,604	544,896	649,590	765,801	955,153	1,098,218	1,256,893	1,432,838	1,627,885
Other income	21,705	44,399	68,491	101,770	146,037	202,420	272,908	360,424	484,449	665,683
Gain / (loss) on sale of assets	-	-	-	-	-	-	-	-	-	-
Earnings Before Interest & Taxes	387,413	495,003	613,387	751,360	911,837	1,157,573	1,371,126	1,617,317	1,917,287	2,293,569
Interest expense	150,192	150,192	133,360	115,181	95,548	74,344	51,443	26,711	-	-
Earnings Before Tax	237,221	344,811	480,027	636,179	816,290	1,083,230	1,319,683	1,590,606	1,917,287	2,293,569
Tax	35,583	51,722	72,004	95,427	122,443	162,484	197,952	238,591	287,593	344,035
<b>NET PROFIT/(LOSS) AFTER TAX</b>	<b>201,638</b>	<b>293,089</b>	<b>408,023</b>	<b>540,752</b>	<b>693,846</b>	<b>920,745</b>	<b>1,121,730</b>	<b>1,352,015</b>	<b>1,629,694</b>	<b>1,949,533</b>
Balance brought forward		201,638	494,727	902,749	1,443,502	2,137,348	3,058,093	4,179,823	5,531,838	7,161,532
Total profit available for appropriation	201,638	494,727	902,749	1,443,502	2,137,348	3,058,093	4,179,823	5,531,838	7,161,532	9,111,065
Dividend	-	-	-	-	-	-	-	-	-	-
Balance carried forward	201,638	494,727	902,749	1,443,502	2,137,348	3,058,093	4,179,823	5,531,838	7,161,532	9,111,065

## 14.2 Balance Sheet

Statement Summaries											SMEDA
Balance Sheet											Rs. in actuals
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>Assets</b>											
<i>Current assets</i>											
Cash & Bank	100,000	382,330	604,311	917,712	1,343,843	1,901,418	2,596,808	3,467,805	4,541,607	6,223,930	8,569,036
Accounts receivable	-	110,873	116,417	128,059	140,865	154,951	170,446	187,491	206,240	226,864	249,550
Finished goods inventory	-	-	-	-	-	-	-	-	-	-	-
Equipment spare part inventory	21,077	23,238	25,620	28,246	31,141	34,333	37,852	41,732	46,009	50,725	-
Raw material inventory	27,300	30,672	34,459	38,715	43,497	48,868	54,904	61,684	69,302	77,861	-
<b>Total Current Assets</b>	<b>359,152</b>	<b>757,887</b>	<b>991,582</b>	<b>1,323,506</b>	<b>1,770,120</b>	<b>2,350,345</b>	<b>3,070,785</b>	<b>3,969,486</b>	<b>5,073,933</b>	<b>6,790,155</b>	<b>8,818,587</b>
<i>Fixed assets</i>											
Land	-	-	-	-	-	-	-	-	-	-	-
Building/Infrastructure	1,069,882	1,016,388	962,894	909,400	855,905	802,411	748,917	695,423	641,929	588,435	534,941
Machinery & equipment	350,000	315,000	280,000	245,000	210,000	175,000	140,000	105,000	70,000	35,000	-
Furniture & fixtures	-	-	-	-	-	-	-	-	-	-	-
Office vehicles	-	-	-	-	-	-	-	-	-	-	-
Office equipment	5,000	4,500	4,000	3,500	3,000	2,500	2,000	1,500	1,000	500	-
<b>Total Fixed Assets</b>	<b>1,424,882</b>	<b>1,335,888</b>	<b>1,246,894</b>	<b>1,157,900</b>	<b>1,068,905</b>	<b>979,911</b>	<b>890,917</b>	<b>801,923</b>	<b>712,929</b>	<b>623,935</b>	<b>534,941</b>
<i>Intangible assets</i>											
Pre-operation costs	301,973	241,578	181,184	120,789	60,395	-	-	-	-	-	-
Legal, licensing, & training costs	-	-	-	-	-	-	-	-	-	-	-
<b>Total Intangible Assets</b>	<b>301,973</b>	<b>241,578</b>	<b>181,184</b>	<b>120,789</b>	<b>60,395</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>TOTAL ASSETS</b>	<b>2,086,007</b>	<b>2,335,353</b>	<b>2,419,659</b>	<b>2,602,195</b>	<b>2,899,420</b>	<b>3,330,257</b>	<b>3,961,702</b>	<b>4,771,410</b>	<b>5,786,862</b>	<b>7,414,090</b>	<b>9,353,527</b>
<b>Liabilities &amp; Shareholders' Equity</b>											
<i>Current liabilities</i>											
Accounts payable	-	21,459	23,081	24,832	26,722	28,763	30,967	33,349	35,923	38,708	33,862
<b>Total Current Liabilities</b>	<b>-</b>	<b>21,459</b>	<b>23,081</b>	<b>24,832</b>	<b>26,722</b>	<b>28,763</b>	<b>30,967</b>	<b>33,349</b>	<b>35,923</b>	<b>38,708</b>	<b>33,862</b>
<i>Other liabilities</i>											
Long term debt	1,877,406	1,877,406	1,667,001	1,439,763	1,194,346	929,296	643,042	333,887	-	-	-
<b>Total Long Term Liabilities</b>	<b>1,877,406</b>	<b>1,903,656</b>	<b>1,693,251</b>	<b>1,466,013</b>	<b>1,220,596</b>	<b>955,546</b>	<b>664,042</b>	<b>349,637</b>	<b>10,500</b>	<b>5,250</b>	<b>(0)</b>
<i>Shareholders' equity</i>											
Paid-up capital	208,601	208,601	208,601	208,601	208,601	208,601	208,601	208,601	208,601	208,601	208,601
Retained earnings	-	201,638	494,727	902,749	1,443,502	2,137,348	3,058,093	4,179,823	5,531,838	7,161,532	9,111,065
<b>Total Equity</b>	<b>208,601</b>	<b>410,238</b>	<b>703,327</b>	<b>1,111,350</b>	<b>1,652,102</b>	<b>2,345,949</b>	<b>3,266,694</b>	<b>4,388,424</b>	<b>5,740,439</b>	<b>7,370,132</b>	<b>9,319,666</b>
<b>TOTAL CAPITAL AND LIABILITH</b>	<b>2,086,007</b>	<b>2,335,353</b>	<b>2,419,659</b>	<b>2,602,195</b>	<b>2,899,420</b>	<b>3,330,257</b>	<b>3,961,702</b>	<b>4,771,410</b>	<b>5,786,862</b>	<b>7,414,090</b>	<b>9,353,527</b>
<i>Note: Total assets value will differ from project cost due to first installment of leases paid at the start of year 0</i>											

### 14.3 Cash Flow Statement

Statement Summaries											SMEDA
Cash Flow Statement											
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Rs. in actuals Year 10
<i>Operating activities</i>											
Net profit	-	201,638	293,089	408,023	540,752	693,846	920,745	1,121,730	1,352,015	1,629,694	1,949,533
Add: depreciation expense	-	88,994	88,994	88,994	88,994	88,994	88,994	88,994	88,994	88,994	88,994
amortization expense	-	60,395	60,395	60,395	60,395	60,395	-	-	-	-	-
Deferred income tax	-	26,250	-	-	-	-	(5,250)	(5,250)	(5,250)	(5,250)	(5,250)
Accounts receivable	-	(110,873)	(5,544)	(11,642)	(12,806)	(14,086)	(15,495)	(17,045)	(18,749)	(20,624)	(22,686)
Finished good inventory	-	-	-	-	-	-	-	-	-	-	-
Equipment inventory	(21,077)	(2,160)	(2,382)	(2,626)	(2,895)	(3,192)	(3,519)	(3,880)	(4,278)	(4,716)	50,725
Raw material inventory	(27,300)	(3,372)	(3,788)	(4,256)	(4,781)	(5,372)	(6,035)	(6,781)	(7,618)	(8,559)	77,861
Accounts payable	-	21,459	1,622	1,751	1,890	2,041	2,204	2,382	2,575	2,784	(4,846)
Other liabilities	-	-	-	-	-	-	-	-	-	-	-
<b>Cash provided by operations</b>	<b>(48,377)</b>	<b>282,330</b>	<b>432,387</b>	<b>540,639</b>	<b>671,548</b>	<b>822,625</b>	<b>981,644</b>	<b>1,180,151</b>	<b>1,407,689</b>	<b>1,682,323</b>	<b>2,134,332</b>
<i>Financing activities</i>											
Change in long term debt	1,877,406	-	(210,405)	(227,238)	(245,417)	(265,050)	(286,254)	(309,155)	(333,887)	-	-
Issuance of shares	208,601	-	-	-	-	-	-	-	-	-	-
Purchase of (treasury) shares	-	-	-	-	-	-	-	-	-	-	-
<b>Cash provided by / (used for) financing :</b>	<b>1,875,232</b>	<b>-</b>	<b>(210,405)</b>	<b>(227,238)</b>	<b>(245,417)</b>	<b>(265,050)</b>	<b>(286,254)</b>	<b>(309,155)</b>	<b>(333,887)</b>	<b>-</b>	<b>210,775</b>
<i>Investing activities</i>											
Capital expenditure	(1,726,855)	-	-	-	-	-	-	-	-	-	-
Acquisitions	-	-	-	-	-	-	-	-	-	-	-
<b>Cash (used for) / provided by investing €</b>	<b>(1,726,855)</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>NET CASH</b>	<b>100,000</b>	<b>282,330</b>	<b>221,981</b>	<b>313,401</b>	<b>426,131</b>	<b>557,575</b>	<b>695,390</b>	<b>870,997</b>	<b>1,073,802</b>	<b>1,682,323</b>	<b>2,345,107</b>
Cash balance brought forward		100,000	382,330	604,311	917,712	1,343,843	1,901,418	2,596,808	3,467,805	4,541,607	6,223,930
Cash available for appropriation	100,000	382,330	604,311	917,712	1,343,843	1,901,418	2,596,808	3,467,805	4,541,607	6,223,930	8,569,036
Dividend	-	-	-	-	-	-	-	-	-	-	-
Cash carried forward	100,000	382,330	604,311	917,712	1,343,843	1,901,418	2,596,808	3,467,805	4,541,607	6,223,930	8,569,036



## 14.4 Useful Project Management Tips

### Technology

- **List of Machinery & Equipment**
- **Required fish seed, feed and medication supplies:** should be procured from reliable sources.
- **Energy Requirement:** Should not be overestimated or installed in excess and alternate source of energy for critical operations be arranged in advance
- **Machinery Suppliers:** Should be asked for training and after sales services under the contract with the machinery suppliers
- **Quality Assurance Equipment & Standards:** Whatever means required products quality standards need to be defined on the packaging and a system to check them instituted, this improves credibility

### Marketing

- **Product Development & Packaging:** Expert's help may be engaged for product/service and packaging design & development
- **Ads & P.O.S. Promotion:** Business promotion and dissemination through banners and launch events is highly recommended. Product brochures from good quality service providers
- **Sales & Distribution Network:** Expert's advise and distribution agreements are required with.
- **Price - Bulk Discounts, Cost plus Introductory Discounts:** Price should never be allowed to compromise quality. Price during introductory phase may be lower and used as promotional tool. Product cost estimates should be carefully documented before price setting. Government controlled prices shall be displayed.

### Human Resources

- **List of Human Resource**
- **Adequacy & Competencies:** Skilled and experienced staff should be considered an investment even to the extent of offering share in business profit.
- **Performance Based Remuneration:** Attempt to manage human resource cost should be focused through performance measurement and performance based compensation.
- **Training & Skill Development:** Encouraging training and skill of self & employees through experts and exposure of best practices is route to success.

Least cost options for Training and Skill Development (T&SD) may be linked with compensation benefits and awards.

#### 14.5 Useful Links

Small & Medium Enterprises Development Authority (SMEDA), [www.smeda.org.pk](http://www.smeda.org.pk)

Prime Minister's Office, [www.pmo.gov.pk](http://www.pmo.gov.pk)

Government of Pakistan, [www.pakistan.gov.pk](http://www.pakistan.gov.pk)

Ministry of Industries & Production, [www.moip.gov.pk](http://www.moip.gov.pk)

Ministry of National Food Security & Research, [www.mnfsr.gov.pk](http://www.mnfsr.gov.pk)

Ministry of Education, Training & Standards in Higher Education, [www.moptt.gov.pk](http://www.moptt.gov.pk)

Government of Punjab, [www.punjab.gov.pk](http://www.punjab.gov.pk)

Government of Sindh, [www.sindh.gov.pk](http://www.sindh.gov.pk)

Government of Khyber Pakhtunkhwa, [www.khyberpakhtunkhwa.gov.pk](http://www.khyberpakhtunkhwa.gov.pk)

Government of Balochistan, [www.balochistan.gov.pk](http://www.balochistan.gov.pk)

Government of Gilgit Baltistan, [www.gilgitbaltistan.gov.pk](http://www.gilgitbaltistan.gov.pk)

Government of Azad Jamu Kashmir, [www.ajk.gov.pk](http://www.ajk.gov.pk)

Trade Development Authority of Pakistan (TDAP), [www.tdap.gov.pk](http://www.tdap.gov.pk)

Security Commission of Pakistan (SECP), [www.secp.gov.pk](http://www.secp.gov.pk)

Federation of Pakistan Chambers of Commerce and Industry (FPCCI)

[www.fpcci.com.pk](http://www.fpcci.com.pk)

Punjab Board of Investment & Trade (PBIT), 23-Aikman Road, GOR-I, Lahore  
Tel. 042-99205201, [www.pbit.gop.pk](http://www.pbit.gop.pk)

Sindh Board of Investment (SBI), 1st Floor, Tower B, Finance & Trade Center, Shahr-e-Faisal, Karachi, Tel. 021-99207512-4, [www.sbi.gos.pk](http://www.sbi.gos.pk)

State Bank of Pakistan (SBP), [www.sbp.org.pk](http://www.sbp.org.pk)

National Bank of Pakistan (NBP), [www.nbp.com.pk](http://www.nbp.com.pk)

First Women Bank Limited (FWBL), [www.fwbl.com.pk](http://www.fwbl.com.pk)

Pakistan Agricultural Research Council (PARC), Islamabad, Tel. 051-9203966  
[www.parc.gov.pk](http://www.parc.gov.pk)

National Agricultural Research Centre (NARC), Islamabad, Tel. 051-9255061,  
[www.parc.gov.pk](http://www.parc.gov.pk)

University of Agriculture, Faisalabad, [www.uaf.edu.pk](http://www.uaf.edu.pk)

Faculty of Veterinary Sciences, University of Agriculture, Faisalabad, [www.uaf.edu.pk](http://www.uaf.edu.pk)

Lasbela University of Agriculture, Water & Marine Sciences, Lasbela,  
[www.luawms.edu.pk](http://www.luawms.edu.pk)

Sindh Agriculture University, Tondojam, [www.sau.edu.pk](http://www.sau.edu.pk)

University of Veterinary & Animal Sciences (UVAS), Out Fall Road, Lahore,

Agribusiness Support Fund (ASF), Lahore, [www.asf.org.pk](http://www.asf.org.pk)

## 15. Key Assumptions

Particular	Assumptions
Sales Price Growth Rate	5 % per year
Capacity Utilization Growth Rate	5 % per year
Increase in Cost of Raw Materials	10 % per year
Increase in utilities (Electricity/Water/Gas)	10 % per year
Debt : Equity Ratio	90 : 10
Depreciation on Plant Building	10 % per annum
Depreciation on Machinery	10 % per annum
Equipment	10 % per annum
Loan Tenure	8 Years
Interest Rate	8 % per annum