Pre-feasibility Study

MUSHROOM FARMING

November 2023

"The figures and financial projections are approximate due to fluctuations in exchange rates, energy costs, and fuel prices etc. Users are advised to focus on understanding essential elements such as production processes and capacities, space, machinery, human resources, and raw material etc. requirements. Project investment, operating costs, andrevenues can change daily. For accurate financial calculations, utilize financial calculators on SMEDA's website and consult financial experts to stay current with market conditions"

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

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2. EXECUTIVE SUMMARY

Throughout the history of mankind, mushrooms have been labeled with varying reputations, considered both food and foe. Mushrooms (the term used to identify the edible sporophores) are the fleshy, spore-bearing[1] fruiting body of a fungus. These are typically produced above ground on soil or on its food source. Mushrooms are not plants because they do not make their own food (plants use photosynthesis process to make food). So mushrooms are placed in a kingdom of fungi[2] apart from plants and animals. These grow on naturally available decaying materials. If suitable climatic conditions and growing medium (decaying material) are available to the spore of mushroom fungi, these develop into the (wild or cultivated) mushrooms.

Hundreds of mushroom species are found in nature. Some of those are edible (such as Agaricus Bisporus (Button Mushroom), Pleurotus Ostreatus (Oyster Mushroom), Pleurotus Eryngii (King Oyster Mushroom), Calocybe Indica (Milky Mushroom) etc. Many others are poisonous and non-edible (such as Amanita Phalloides, Conocybe Filaris, Cortinarius, Galerina Marginata, etc.). Most of the mushrooms that are consumed by humans are formally cultivated.

Mushrooms contain essential vitamins and minerals which make them an excellent addition to human diet, contributing positively to human health. Loaded with many health-boosting vitamins, minerals, and antioxidants, they have long been recognized as an important part of the human food chain.

The proposed business project of “Mushrooms Farming” grows two types of edible mushrooms: Agaricus Bisporus, commonly known as button mushroom and Pleurotus Ostreatus, commonly known as oyster mushroom. These edible mushrooms are grown by providing suitable cultivation medium and controlled climatic conditions to the mushroom propagating material, using different materials and equipment to carry out the required processes and techniques, as per the recommended parameters.

The project is suggested to be located in or around a large city; since mushrooms are largely consumed by the urban population. Also, the required agriculture inputs for mushroom farming are easily available in large cities. Therefore, the proposed mushroom farm would ideally be located in or around major cities of Pakistan like Karachi, Lahore, Islamabad, Faisalabad, Islamabad, Peshawar, Quetta, Hyderabad, Rawalpindi and other cities of Pakistan. These cities are suitable also due to the availability of good infrastructure and skilled personnel.

It is assumed that the production capacity for the mushroom farm is 70% during the first year of its operations. The capacity will increase at the rate of 5% per annum attaining 90% of its total in 5 years. The farm will annually produce 9,450 kg of button mushroom in 7 production cycles in a year and 20,250 kg of oyster mushroom in 12

[1] without flower or bloom and not producing seeds.

[2] A fungus (plural: fungi) is a type of eukaryotic organism belonging to the kingdom Fungi, alongside plants, animals, protozoa, and monera. Fungi are incredibly diverse, with commonly encountered forms including yeast, molds, truffles, and mushrooms.

production cycles in a year. The proposed farm will sell its production in both wholesale and retail markets in the proportion of 60:40 respectively in the packing sizes of 150-gram, 250 gram and 1000 gram.

At maximum capacity, in the wholesale market, button mushroom production will be distributed into 20,412 packets which include 11,340 150-gram packets, 6,804 250-gram packets and 2,268 1000-gram packets. Oyster mushroom production will be distributed into 43,740 packets which include 24,300 150-gram packets, 14,580 250-gram packets and 4,860 1000-gram packets. In the retail market, button mushroom production will be distributed into 13,608 packets which include 7,560 150-gram packets, 4,536 250-gram packets and 1,512 1000-gram packets. Oyster mushroom production will be distributed into 29,160 packets which include 16,200 150-gram packets, 9,720 250-gram packets and 3,240 1000-gram packets.

At initial year production capacity utilization of 70%, in the wholesale market, button mushroom production will be distributed into 14,289 packets which include 7,938 150-gram packets, 4,763 250-gram packets and 1,588 1000-gram packets. Oyster mushroom production will be distributed into 30,618 packets which include 17,010 150-gram packets, 10,206 250-gram packets and 3,402 1000-gram packets. In the retail market, button mushroom production will be distributed into 9,525 packets which include 5,292 150-gram packets, 3,175 250-gram packets and 1,058 1000-gram packets. Oyster mushroom production will be distributed into 20,412 packets which include 11,340 150-gram packets, 6,804 250-gram packets and 2,268 1000-gram packets.

This farm will be set up in a rented building with an area of 3,600 square feet (16 Marla). The proposed business requires a total investment of PKR 22.29 million. This includes capital investment of PKR 20.93 million and working capital of PKR 1.36 million. The project will be established using 100% equity financing. The Net Present Value (NPV) of project is PKR 2.05 million with an Internal Rate of Return (IRR) of 27% and a Payback period of 4.16 years.

The proposed project will provide employment opportunities to 26 people, working in a single shift of 8 hours each during 360 days in a year. High return on investment and steady growth of business is expected to the entrepreneur having some prior experience or education in the related field of business. The legal business status of this project is proposed as “Sole Proprietorship” or “Partnership “concern.

3. INTRODUCTION TO SMEDA

The Small and Medium Enterprises Development Authority (SMEDA) was established in October 1998 with the 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 ‘sectorial 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.

National Business Development Program for SMEs (NBDP) is a project of SMEDA, funded through Public Sector Development Program of Government of Pakistan.

The NBDP envisages provision of handholding support / business development services to SMEs to promote business startup, improvement of efficiencies in existing SME value chains to make them globally competitive and provide conducive business environment through evidence-based policy-assistance to the Government of Pakistan. The Project is objectively designed to support SMEDA's capacity of providing an effective handholding to SMEs. The proposed program aimed at facilitating around 314,000 SME beneficiaries over a period of five years.

4. 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 setting up a “Mushrooms Farming” by providing a general understanding of the business with the intention of supporting them in 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 setup and its successful management.

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

5. BRIEF DESCRIPTION OF PROJECT & PRODUCTS

Mushrooms are the edible fleshy fruiting bodies which have a long association with humankind and provide profound biological and economic benefits. Since ancient

times, man has been consuming wild mushrooms as a delicacy[3] to enjoy its pleasing taste. Edible mushrooms provide high quantity and quality of protein that can be produced with greater biological efficiency than animal protein. Mushrooms are rich in fiber, minerals and different types of vitamins.

As mushrooms have no leaves, roots or seeds, they are not considered vegetables and fall under the category of fungi. Plants having chlorophyll, manufacture their food by the process of photosynthesis in the presence of sunlight. Fungi are devoid of chlorophyll and thus cannot produce their own food. However, mushrooms are still consumed as vegetables.

There are thousands of types of mushrooms in the world. Majority of the types are grown wild and all are not edible. Out of over 2000 identified varieties of edible mushrooms, around twenty varieties are under commercial cultivation. There are four types of mushrooms which are more popular with respect to their commercial potential. The common and botanical names of those mushrooms are shown in Table 1.

Table 1: Four Popular Mushroom Types

Sr. No.	Common Name	Botanical Name
1.	Button Mushroom	Agaricus Bisporus
2.	Oyster Mushroom	Pleurotus Ostreatus
3.	King Oyster Mushroom	Pleurotus Eryngii
4.	Milky Mushroom	Calocybe Indica

[3] something pleasing to eat that is considered rare or luxurious

The four popular types of mushrooms are shown in Figure 1, Figure 2, Figure 3 and Figure 4.

Figure 1: Button Mushrooms

Figure 2: Oyster Mushrooms

Figure 3: King Oyster Mushrooms

Figure 4: Milky Mushrooms

Mushroom farming today, is being practiced in more than 100 countries, and its production is continuously increasing. In some developed countries of Europe and America, mushroom farming has attained the status of a high-tech industry with very high levels of mechanization and automation. Cultivation of mushrooms is commercially carried out by providing suitable growing media and maintaining the required climatic conditions for getting maximum production.

Mushroom cultivation is also important from the perspective of bringing in diversification in the local farming system. Mushroom cultivation, not only helps increase diversification, but also helps in addressing the problems of quality food, health and environment related issues. Utilizing agro-industrial wastes for growing mushrooms can enhance incomes and help better achieve sustainability in the local agriculture. Commercial production of edible mushrooms converts the agricultural, industrial, forestry and household wastes into nutritious food (mushrooms).

Uses of Mushrooms

Mushrooms, being edible, delicious, and healthy products, are used to prepare different cuisines all around the world. Some mushrooms are also used for medicinal and many other purposes. Different uses of mushrooms are discussed below:

Uses of Mushrooms as Food

Mushrooms have a unique texture, good aroma, taste and flavor that makes them unique when compared to many other types of food. Mushrooms are highly nutritive food, offering rich supply of quality proteins, vitamins and minerals. They are an important natural source of food having high fiber, low fat and low starch. Edible mushrooms have been considered to be ideal food for obese[4] persons and for diabetics to prevent hyperglycemia. These may be fried, stir-fried, roasted, used as toppings on pizza, and may be added to soups, creamy sauces and pastas. Figure 5 and Figure 6 shows dishes prepared with mushrooms.

Figure 5: Mushrooms Uses as Food

[4] Body weight that is greater than what is considered normal or healthy for a certain height.

Figure 6: Mushrooms Uses as Food

Uses of Mushrooms as Medicine

Mushrooms represent not only a source of nutrients but also have high medicinal value, useful in preventing diseases such as hypertension, diabetes, hypercholesterolemia and cancer. Some mushrooms species have antitumor, antiviral, and antithrombotic and immunomodulation properties. Some mushrooms also have potential to lower elevated blood sugar levels.

Uses of Mushroom in Environment Conservation

Mushrooms, being fungi, are classified as primary decomposers in the ecosystem. Decomposers are crucial in the recycling of organic matter within the ecosystem because these break down the decaying organic matter into absorbable nutrients. Unlike plants, fungi lack chlorophyll and can only make their own food by decomposing dead plant and animal matter. Multiple species of fungi mushrooms excrete enzymes that break down dead and decaying organic material into usable compounds. Figure 7 shows mushroom application as decomposer.

Figure 7: Mushroom Application as Decomposer

There are thousands of species of mushrooms in the world, many of which are grown wild. All types of mushrooms are not edible, majority are non-edible and poisonous. Out of the approximately 13,000 identified varieties of edible mushrooms, there are limited varieties which are used for commercial cultivation. In the proposed project, it has been assumed that the business grows two types of mushrooms which are more popular with respect to their commercial potential. These are commonly known as Button Mushroom and Oyster Mushroom. Descriptions of these two types of mushrooms are as follows:

Button Mushroom (Agaricus Bisporus)

The white mushrooms, resembling the shape of buttons, are commonly known as Button mushroom. These are naturally grown in meadows, and thus are also called meadow mushrooms. Another name of these mushrooms is European mushroom. These are grown and consumed in large quantities throughout the world. These are also the least expensive, have the mildest flavor, though these readily absorb the flavors of other ingredients with which these are cooked. These may be eaten raw, or cooked via sautéing, stir-frying, grilling, braising or roasting. Figure 8 shows Button mushrooms.

Figure 8: Button Mushroom

Oyster Mushroom (Pleurotus Ostreatus)

Oyster Mushrooms are one of the most common types of cultivated mushrooms in the world. These are also known as Pearl Oyster mushrooms or Tree Oyster mushrooms. Oyster mushrooms are loved for their delicate texture and mild, savory flavor. They are eaten in a variety of cuisines and are especially popular in Chinese, Japanese and Korean cooking. Oyster mushrooms are loaded with fiber, vitamins, minerals, and other important nutrients. They are also low in carbohydrates, which makes them a good choice for people following low carb dietary patterns. Figure 9 shows Oyster mushrooms.

Figure 9: Oyster Mushroom

5.1 Opportunity Rationale

Mushroom business has a wide impact on livelihoods and poverty reduction. Mushroom cultivation does not require a lot of land and offers better per acre profits. Mushroom growing does not require large capital investment and the scale of cultivation can be chosen according to the availability of investment. Mushrooms can also be cultivated on a part-time basis with little maintenance. Establishing mushrooms cultivation and processing facility is a good investment opportunity from multiple perspectives. Key factors are discussed below:

5.1.1. Abundant Availability of Raw Material

Pakistan is an agriculture country and there is abundant availability of agriculture raw materials like wheat straw, rice straw, cotton waste, etc. to be used for preparing compost for mushrooms cultivation.

5.1.2. Large Export Market

Mushrooms have a large export market triggered by their increasing global consumption. Pakistan can target to increase mushrooms production to get a respectable share of this large market. Country's existing presence (though small) in mushrooms export market indicate towards this potential and provide a base to further increase this market penetration by realizing new investments in the sector.

5.1.3. Large Local Market

By being a populous country with sizeable middle-to-upper income class, Pakistan can be developed into a large market for mushrooms.

5.1.4. Existing Market Presence

Pakistan already has a presence in mushrooms production and exports. There are number of small producers in Pakistan and the country has small export volumes as

well. This presence can be capitalized upon to further develop the sector to achieve its fullest potential in the years to come.

5.1.5. CPEC

Investments under CPEC can open new opportunities to trade products like mushrooms between Pakistan, China and other countries of the region.

Mushroom Cultivation

The basic concept and procedure for cultivation of Button and Oyster mushrooms is dependent on the compost and spawn. Spawn is mixed with compost and put in a special room or under shade as required for a certain period under required temperature and humidity.

Spawn

The mushroom spores, termed as spawn, constitute the main propagating material for mushroom production. Spawn is the living fungal culture, called Mycelium,[5] grown onto a substrate. It provides the basis of any mushroom growing operation. It is the equivalent of seed for a mushroom farm. Spawn preparation is a highly specialized and technical job, and only large-scale mushroom growers can afford to produce their own spawn. In the proposed project, business will purchase spawn from local commercial spawn producers or suppliers. Figure 10 shows mushroom spawn.

Figure 10: Mushroom Spawn

[5] A mycelium is a network of fungal threads or hyphae. Mycelia often grow underground but can also thrive in other places such as rotting tree trunks. A single spore can develop into a mycelium. The fruiting bodies of fungi, such as mushrooms, can sprout from a mycelium.

Compost

Compost can be made from various things including wheat straw, cotton meal, cotton seed hulls, horse dung and poultry waste. These things are used along with water and gypsum. Composting converts these materials into a suitable nutritional substrate/ medium for the growth of mushrooms. As mushrooms cannot synthesize their food themselves, therefore all the required nutrients are supplied in the compost. Bags are filled with fresh compost and placed in a controlled environment for several days for quality mushroom production. Figure 11 shows different types of materials which may be used as mushroom compost.

Figure 11: Mushroom Compost

Peat Moss

Peat moss remains the primary component for casing layers in the cultivation of mushrooms. Peat moss is combined with limestone and other materials to induce mushroom pinning and development. Layer of peat moss is spread over the compost to maintain humidity and facilitate formation of mushrooms. In the proposed project, it will be used for casing of button mushroom. Figure 12 shows Peat Moss.

Figure 12: Peat Moss

Pasteurization Tunnel

Mushroom pasteurization tunnel, with dimension 15 feet by 15 feet by 9 feet (Length*Width*Height), is a constructed structure, which consists of underground duct system, used to provide moisture to mushroom compost. It is insulated from all sides and is provided with an insulated opening gate. Fresh air is allowed into the tunnel through a small passage. Blower is used to extract air from the insulated tunnel and steam (produced by steam boiler) is injected into the tunnel through underground duct system. Figure 13 shows Mushroom pasteurization tunnel.

Figure 13: Pasteurization Tunnel

Bunker

Bunker is a self-constructed structure, with dimensions 15 feet by 15 feet by 9 feet (Length*Width*Height), which consists of an underground duct system. This duct system is used to provide moisture to mushroom compost. Moisture and humidity of compost is maintained by providing accurate quantity of moist air, supplied under pressure to the compost, using a blower. Blower uses the air extracted from tunnel to increase the moisture level of compost which reduces the ammonia production in compost. Figure 14 mushroom compost bunker.

Figure 14:Mushroom Compost Bunker

5.2 Machinery and Equipment

Details of machinery and equipment used in purposed project are as follows:

Air Handling Unit (AHU)

An air handling unit (commonly called an AHU) is the composition of elements, mounted in large, accessible box-shaped unit. It houses the appropriate ventilation requirements for purifying, air-conditioning or intake the air through ducts, in the building or facility. After attaining the required temperature, the chamber automatically closes to save the electricity cost, and also to save the mushrooms from getting very cool. In the proposed mushroom farming project, the AHU system performs multiple functions, including filtration and control of the quality of the air, control of the indoor air temperature, humidity monitoring for greater indoor comfort and Carbon Dioxide levels through in-built sensors and controls. Figure 15 shows Air Handling Unit.

Figure 15: Air Handling Unit

Compost Turner

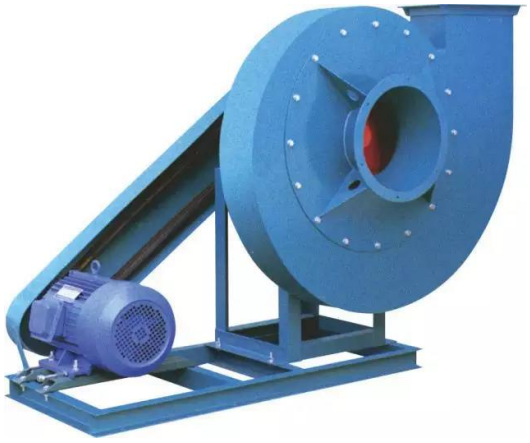
Compost turner is used for mixing or composting of agricultural waste, organic waste, poultry manure, straw, mushroom residue, sugar residue, etc. In the proposed project, a tractor towable compost turner is used to prepare the compost. The whole machine has a hydraulic control system which features pivot steering, large torque, easy moving, and convenient operation. Water can be supplied to the compost, during the turning by a pull behind or mounted water tank. It can be towed with the tractor of 60 HP or more. Figure 16 shows compost turner.

Figure 16: Compost Turner

Blower

Blower, commonly known as centrifugal fan, is an equipment which increases the velocity of air or gas when passed through its impellers. It is mainly used for generating a flow of air/gas required for exhausting, aspirating, cooling, ventilating or conveying. In the proposed project, 4 blowers are used. 2 blowers of 3 HP are used to provide exhaust air into the bunker through duct system and 2 blowers of 5 HP are used to extract air from the tunnel to build pressure inside. They have speed of 1500-3000 RPM and air volume of 2100-50000 cubic meter per hour. Figure 17 shows blower.

Figure 17: Blower



Steam Boiler

In the proposed project, pressurized steam is generated inside the boiler by heating water. The steam is transferred through pipes to the point of use. It is a gas-fired operated device. In the proposed project, natural gas is used for steam generation. However, for some basic functioning, the boiler also consumes electricity of 500 watts. It has an evaporation rate of 50-500 kg per hour and steam temperature of 170C and water capacity of 25-50 liter. Figure 18 shows steam boiler.

Figure 18: Steam Boiler

Cold Storage Chamber

Cold storage chamber is a container, maintained at lower temperature, used to store vegetables and fruits. It has an in-built system of maintaining the cooling temperature required for storage. After attaining the required temperature, the chamber automatically closes to save the electricity cost as well as to save the mushroom getting over cooled. In the proposed business model, cold storage chamber will be used to store mushrooms. It has an electricity consumption of 850 watts and temperature range of -40℃ to +10℃. Figure 19 shows cold storage chamber.

Figure 19: Cold Storage Chamber

Mushroom Packing Machine

Mushroom Packing Machine is an automatic packing machine which is used for packing of different types of trays. It has a moving belt conveyor on which the product is placed for keeping it inside the packing machine. A PVC film is wrapped around the tray by this machine. It has an electricity consumption of 1440 watts and packaging capacity of 30 packets/min Figure 20 shows mushroom packing machine

Figure 20: Mushroom Packing Machine

Water Pump

A water pump is a machine used to increase the pressure of water to move it from one point to another. In the proposed project, it will be used for supply of water at different points through rubber pipes. It has an electricity consumption of 0.37 KW. Figure 21 shows water pump.

Figure 21: Water Pump

500 kg Weighing Scale

In the proposed project, weighing scale of 500 kg load capacity is used to weigh raw materials. It has an electricity consumption of 20 Watts. Figure 22 shows weighing scale.

Figure 22: Weight Scale 500kg

Weighing scale of 10 kg

A smaller weight scale of 10 kg load capacity is used to weigh finished goods. It has an electricity consumption of 8 watts. Figure 23 shows weighing scale of 10 kg.

Figure 23: Weight Scale 10Kg

Generator 50 KVA

In the proposed project, a 50 KVA generator is used to provide consistent backup power supply. The fuel tanks of this generator can provide continuous electricity for 8 hours. Figure 24 shows generator 50KVA.

Figure 24: Generator 50KVA

5.3 Consumables Inventory

Consumables inventory required in “Mushroom Farming” is described as follows:

Gardener Forks

A garden fork, spading fork, or digging fork is an agri-implement, with a handle and a square-shouldered head featuring several (usually four) short, sturdy tines. In the proposed project, it will be used for twisting, rotating compost material. Figure 25 shows gardener fork.

Figure 25: Gardener Fork

Harvesting Baskets

In the proposed project, rectangular plastic baskets are used to collect and carry mushrooms after plucking. Figure 26 shows harvesting basket.

Figure 26: Harvesting Basket

Harvesting Knife

In the proposed project, curved stainless steel blade mushroom harvesting knife is used to pluck the mushrooms. Curved blade allows easy slicing through the stem without disrupting or pulling up the mushroom mycelium. Figure 27 shows harvesting knife.

Figure 27: Harvesting Knife

Formalin Solution

In the proposed project, a 37% aqueous (water) solution of formaldehyde, a pungent gas, with the chemical formula HCHO, is used as an antiseptic (disinfectant).

Mushroom Humidifier

In the proposed project, mushroom humidifier is used to spray the formalin solution to make the mushroom chamber safe and disinfectant. Figure 28 shows mushroom humidifier.

Figure 28: Mushroom Humidifier

PP (Polypropylene) Woven Sack Bag

PP sacks are used for packaging various types of products. In the proposed project, these sacks are used to transfer pasteurized compost to spawn filling point. Figure 29 shows pp (polypropylene) woven sack bag.

Figure 29: PP (Polypropylene) Woven Sack Bag

PP (Polypropylene) Plastic Bag

PP plastic bags are flexible thin and are made up of polypropylene material. In the proposed project, breathable polypropylene bags of 8 kg capacity (for button mushroom) and 4 kg capacity (for oyster mushroom), with filters, are used for mushroom growing. These are strong heat resistant bags which are used to sterilize, supplement substrates for mushroom growing and spawn production. Figure 30 shows PP plastic bag.

Figure 30: PP (Polypropylene) Plastic Bag

PVC Watering Pipe

Made of soft plastic, PVC pipe is ideal for watering the plants and trees in gardens and for other water supplies. In the proposed project, it is used for various purposes of water supplying. Figure 31 shows PVC watering pipe.

Figure 31: PVC Watering Pipe

Shrink Wrap Roll

These plastic wrap sheets are used for wrapping of mushroom filled packets/trays, using a packaging machine. Figure 32 shows shrink wrap roll.

Figure 32: Shrink Wrap roll

Mushroom Punnet Tray

In the proposed project, business uses Punnet trays of different capacities (150 g, 200 g and 1,000 g) for packaging of button and oyster mushroom. Figure 33 shows mushroom Punnet trays.

Figure 33: Mushroom Punnet Trays

Steel Racks

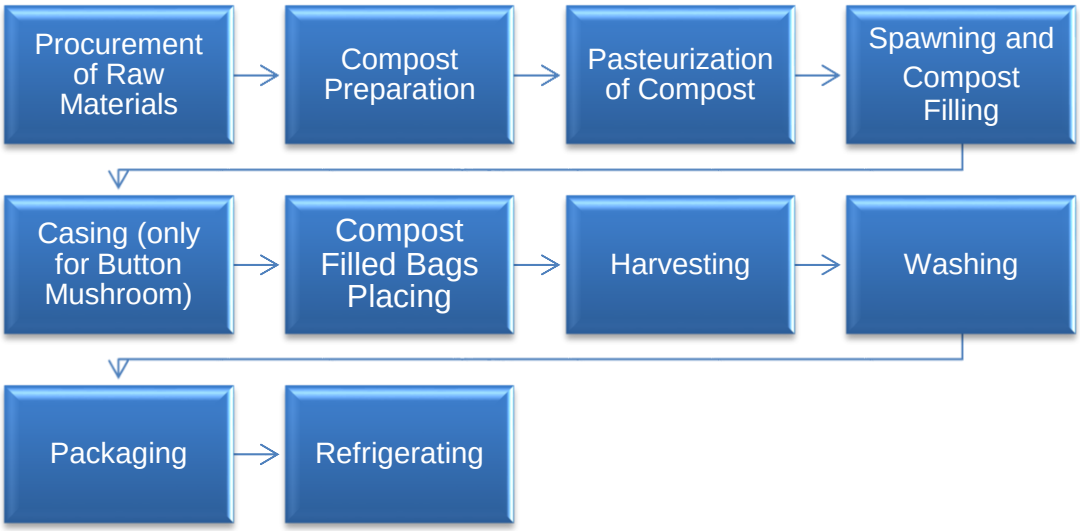
In the proposed project, steel racks are used to place the filled compost bags for mushroom cultivation. It has a dimension (L*W*H) of 8*1.5*8. Each steel rack has 4 number on shelfs. In proposed project, for button mushroom, 5 bags of compost is placed on each shelf of steel rack and for oyster mushroom, 8 bags of compost is placed on each shelf of steel rack.Figure 34 shows steel rack.

Figure 34: Steel Racks

5.4 Process Flow for Mushroom Farming

A general process flow of a mushroom farm is shown in Figure 35.

Figure 35: Process Flow for Mushroom Farming



Brief description of the process flow is as follows:

Procurement of Raw Materials

In mushroom cultivation, different raw materials are mixed at different stages. Some of these raw materials are locally purchased and some are imported. The quality of product is mainly dependent on the quality of raw materials introduced at different stages. There are some common raw materials like wheat straw, poultry manure, gypsum and khal choker etc.

Figure 36: Cotton Waste for Mushroom Farming

In addition, there are some specific raw materials (spawn) for button and oyster mushrooms. Common materials can be purchased locally while the spawn is a high-quality material and requires high investment for producing. Therefore, spawn will be imported for button and oyster mushroom cultivation from other countries like China, United States, UK, Germany etc. The business maintains raw material inventory of one month and half month respectively.

Compost Preparation

Composting converts raw materials into a suitable nutritional substrate/medium for the growth of mushrooms. Compost preparation is done by mixing the raw materials with water. Different materials are mixed to form a compost ready for mushroom growing. This process takes place in many days. Compost preparation for button and oyster mushroom is different in term of the required materials and number of days required for compost preparation. Compost preparation for both types of mushrooms are discussed as under:

Compost Preparation for Button Mushroom

Compost preparation for button mushroom cultivation is started by mixing wheat straw, poultry manure, gypsum and khal chokar in the required proportion. The quantity of raw materials required for a batch of 1 ton of button mushroom is shown in Table 2.

Table 2: Raw Materials for a Batch of 1 Ton of Button Mushroom Compost

Sr. No.	Raw Materials	Quantity (Kg)
1.	Wheat Straw	1,000
2.	Poultry Manure	400
3.	Gypsum	70
4.	Khal Chokar	50

These ingredients are mixed in compost area (compost yard) with the turner, towed by the tractor and spraying water through the water container mounted on the turner. Water is supplied from the water reservoir where it is stored using water pump. The mixed ingredients of the compost are left in open area for 12 days for completion of chemical and biological processes. The material requires several turnings. First turning is done on the fourth and second on the seventh day. Khal choker and gypsum are added and mixed thoroughly. Third turning is done the tenth day and fourth on the twelfth day. After completion of all chemical and biological processes, the material obtained at the end has a weight of around one ton.

Compost Preparation for Oyster Mushroom

Compost preparation for oyster mushroom cultivation is started by mixing wheat straw, gypsum and khal choker in the required proportion. The quantity of these raw material requires for a batch of 1 ton of oyster mushroom is shown in Table 3.

Table 3: Raw Materials for a Batch of 1 Ton of Oyster Mushroom Compost

Sr. No.	Raw Materials	Quantity (Kg)
1.	Wheat Straw	1,000
2.	Gypsum	7
3.	Khal Chokar	50

These ingredients are mixed in compost area (compost yard) with the turner, towed by the tractor and spraying water through the water container mounted on the turner. Water is supplied from the water reservoir where it is stored using water pump. The mixed ingredients of the compost are left in open area for 7 days for the completion of further chemical and biological processes with several turnings. First turning start on the fourth day and the second (last) turning is done on seventh day. After completion

of all chemical and biological processes, the material obtained at the end has a weight of around one ton.

After this stage, compost is transferred by labor for pasteurization.

Pasteurization of Compost

Pasteurization of the compost is an important step. Pasteurization kills insects, bacteria and harmful organisms that may affect mushroom growth and productivity. In the proposed project, two bunkers and two tunnels are constructed for this purpose. One bunker and one tunnel is used for button compost pasteurization and the others for oyster compost pasteurization. Compost is moved from compost yard to bunkers.

Pasteurization of Compost of Button Mushroom

Button mushroom compost is transferred from compost yard to the bunker, where there is a constructed system of underground ducts to maintain humidity of compost. It is then transferred to pasteurization tunnel specified for button mushrooms. In the pasteurization tunnel, temperature is raised to 60 C and maintained for 4-6 hours. Temperature of compost is later maintained in the range 48-52 C for 2-3 days while controlling the relative humidity at 80-100%. The blower circulates air inside the tunnel through underground ducts at the rate of 150-250 cubic meter per hour for a batch of one ton compost.

Pasteurization of Compost of Oyster Mushroom

Oyster mushroom compost is be transferred from compost yard to the bunker and then to pasteurization tunnel specified for oyster mushroom. In the pasteurization tunnel, temperature is raised to 60 C and maintained for 3-4 hours. Temperature of compost is later maintained in the range 48-52 C for 2-3 days while controlling the relative humidity at 80-100%. The blower circulates air inside the tunnel through underground ducts at the rate of 150-250 cubic meter per hour for a batch of one ton compost.

After pasteurization, compost is filled in 50 kg capacity PP (polypropylene) woven sacks to transfer this pasteurized compost into compost filling station.

Spawning and Compost Filling

After pasteurization, compost filled PP bags are transferred to production hall by the labor to the area specified for spawning and compost filling. This process takes about 1-2 days. In the production hall, temperature is maintained in the range 23-25 C and humidity level is maintained at 95-100% through AHU.

Button mushroom spawn and compost are filled in PP bags of 8 kg in required proportion, whereas, oyster mushroom spawn and compost are filled in PP bags of 4 kg. Difference of compost filling capacity of bag for oyster and button mushroom is due to difference in growing process cycles, output ratio and fruiting cycles.

After this, spawn and compost filled plastic bags are transferred to steel racks in mushroom growing hall where temperature, humidity and Carbon Dioxide levels are

maintained through air handling unit which have in-built sensors and controlling systems.

Casing (Only for Button Mushrooms)

Casing is an important step in button mushroom cultivation. Casing involves the covering of compost with a thin layer of sterile soil or materials to maintain moisture and gaseous exchange. The main function of the casing layer is to keep the moisture retention in the substrate which is necessary for mushroom fruit body formation.

In the casing process for button mushrooms, compost filled plastic bag beds are cased when white covering appears on the compost surface, which indicates decrease of moisture level. Layer of peat moss (a specially prepared soil) is spread over the compost to maintain humidity and facilitate formation of mushrooms. Chemicals required for pest and disease control are mixed in the casing material. The pH[6] of this casing soil should be in the range 7.5-7.8.

Compost Filled Bags Placing

In this step, the compost and spawn filled bags of button and oyster mushroom are transferred to production hall for placement on racks. Each rack consists of 4 shelves and on each shelf of rack 7 bags of button mushrooms compost and 8 bags of oyster mushroom composts are placed for growing under controlled condition. Figure 37 shows the compost bags placed in the racks.

Figure 37: Bags Placed in Racks

[6] Scale used to specify the acidity or basicity of an aqueous solution

Harvesting

On appearance of pinheads of the mushrooms, harvesting is started.

Button Mushroom

First harvesting of button mushrooms is started after 33 days. Second and third harvesting is done after every 7-8 days using mushroom harvesting knife. Mushrooms are collected in plastic baskets.

Oyster Mushroom

First harvest of oyster mushrooms is started after 16 days, second and third harvesting is done after every 7-8 days with the help of mushroom harvesting knife. Mushrooms are collected in plastic baskets. Figure 38 shows oyster mushrooms ready for harvesting.

Figure 38 – Oyster Mushrooms Ready for Harvesting

In the proposed project, button and oyster mushroom will be harvested 3 times. On 1st harvesting 100% mushroom will be harvested. Subsequently, it will be reduced by 10% and 20% respectively on 2nd and 3rd harvesting.

After completing harvesting process of mushroom (1st, 2nd and 3rd harvesting) the compost filled bags are sold in local market as fertilizer or animal feed.

Washing

After harvesting, the plucked mushrooms are washed with water for some minutes to remove any dirt. Washing is also necessary to prevent mushroom brownish discoloration and stalk elongation. It is important to cool mushrooms after harvesting.

Packaging

After washing the mushrooms, these are packed into packets of different sizes, for wholesale and retail markets. Both types of mushrooms are packed into the packaging

of 150 g, 250 g and 1000 g separately with the help of automatic mushroom packaging machine.

Refrigerating

After packaging, mushrooms packets are transferred to finished goods store in the cold storage chamber where these are stored at a temperature of 2C to -4C until sold. Business will maintain finished goods inventory of half month. Business will also use cold container vehicle for mushroom delivery at customer premises.

5.5 Installed and Operational Capacities

It is assumed that the operational capacity for the mushroom farm is 70% during the first year of its operations. The capacity will increase at the rate of 5% per annum attaining 90% of its total in 5 years. The farm will annually produce 9,450 kg of button mushroom in 7 production cycles in a year and 20,250 kg of oyster mushroom in 12 production cycles in a year. The proposed farm will sell its production in both wholesale and retail markets in the proportion of 60:40 respectively in the three packing sizes of 150-gram, 250-gram and 1000-gram.

At maximum capacity, in the wholesale market, button mushroom production will be distributed into 20,412 packets which include 11,340 150-gram packets, 6,804 250-gram packets and 2,268 1000-gram packets. Oyster mushroom production will be distributed into 43,740 packets which include 24,300 150-gram packets, 14,580 250-gram packets and 4,860 1000-gram packets. In the retail market, button mushroom production will be distributed into 13,608 packets which include 7,560 150-gram packets, 4,536 250-gram packets and 1,512 1000-gram packets. Oyster mushroom production will be distributed into 29,160 packets which include 16,200 150-gram packets, 9,720 250-gram packets and 3,240 1000-gram packets.

At initial year production capacity utilization of 70%, in the wholesale market, button mushroom production will be distributed into 14,289 packets which include 7,938 150-gram packets, 4,763 250-gram packets and 1,588 1000-gram packets. Oyster mushroom production will be distributed into 30,618 packets which include 17,010 150-gram packets, 10,206 250-gram packets and 3,402 1000-gram packets. In the retail market, button mushroom production will be distributed into 9,525 packets which include 5,292 150-gram packets, 3,175 250-gram packets and 1,058 1000-gram packets. Oyster mushroom production will be distributed into 20,412 packets which include 11,340 150-gram packets, 6,804 250-gram packets and 2,268 1000-gram packets.

The installed and operational capacity of the business is shown in Table 7 and Table 8.

Table 4: Production Cycle of Business

Mushroom Type	Time Required for Compost Preparation & Pasteurization Process (Days)	Time Required for Spawning Process (Days)	Time Required for Casing Process (Days)	Time Required for 1st Harvesting (Days)	Time Required for 2nd Harvesting (Days)	Time Required for 3rd Harvesting (Days)	Total Time per Batch (Days)	Total Working Days in a Year	No of Production Cycles per year
Button Mushrooms	15	3	8	7	7	7	47	360	7
Oyster Mushrooms	7	2	-	7	7	7	30		12
Total									**19**

Table 5: Annual Mushroom Production

Mushroom Type	No of Bags of Compost Per Production Cycle	Average Mushroom Produced by one Bag (Kg)	Total Mushroom Production in 1st Harvesting (Kg)	Total Mushroom Production in 2nd Harvesting (Kg)	Total Mushroom Production in 3rd Harvesting (Kg)	Total Mushroom Production per Batch (Kg)	Total No of Production Cycles per year	Annual Mushroom Production (Kg)
Button	125	4	500	450	400	1,350	7	9,450
Oyster	250	2.5	625	563	500	1,688	12	20,250
Total	**375**						**19**	**29,700**

Table 6: Distribution Ratio

Distribution Channel	Ratio
Wholesale	60%
Retail	40%
Total	**100%**

Table 7: Installed and Operational Capacity of Mushroom-Wholesale Market

Packaging	Annual Mushroom Production @ 100% (Kg)	Wholesale Sale Ratio (%)	Wholesale Quantity (Kg)	Product Ratio	Distributed Quantity (Kg)	Distributed Quantity (Gram)	Gram in One Packet	No of Packets @100%	No of Packets @70%
Button Mushroom									
Packets 150 g	9,450	60%	5,670	30%	1,701	1,701,000	150	11,340	7,938
Packets 250 g				30%	1,701	1,701,000	250	6,804	4,763
Packets 1000 g				40%	2,268	2,268,000	1,000	2,268	1,588
Sub-Total								**20,412**	**14,289**
Oyster Mushroom									
Packets 150 g	20,250	60%	12,150	30%	3,645	3,645,000	150	24,300	17,010

Packets 250 g				30%	3,645	3,645,000	250	14,580	10,206
Packets 1000 g				40%	4,860	4,860,000	1,000	4,860	3,402
Sub-Total								**43,740**	**30,618**
Total								**64,152**	**44,907**

Table 8: Installed and Operational Capacity of Mushroom-Retail Market

Packaging	Annual Mushroom Production @ 100% (Kg)	Retail Sale Ratio	Retail Quantity (Kg)	Product Ratio	Distributed Quantity (Kg)	Distributed Quantity (Gram)	Gram in One Packet	No of Packets @100%	No of Packets @70%
Button Mushroom									
Packets 150 g	9,450	40%	3,780	30%	1,134	1,134,000	150	7,560	5,292
Packets 250 g				30%	1,134	1,134,000	250	4,536	3,175
Packets 1000 g				40%	1,512	1,512,000	1,000	1,512	1,058
Sub-Total								**13,608**	**9,525**
Oyster Mushroom									
Packets 150 g	20,250	40%	8,100	30%	2,430	2,430,000	150	16,200	11,340
Packets 250 g				30%	2,430	2,430,000	250	9,720	6,804

Packets 1000 g				40%	3,240	3,240,000	1,000	3,240	2,268
Sub-Total								**29,160**	**20,412**
Total								**42,768**	**29,937**

6. CRITICAL FACTORS

Before making the decision to invest in mushroom farming, one should carefully analyze the associated risk factors. The important considerations in this regard include:

- Suitable location of mushroom farm, since humidity, temperature and light have major effect on growth of mushrooms.
- Procurement of high-quality spawn
- Sound technical knowhow and basic knowledge of the business
- Availability of specialized workforce
- Selection of appropriate machinery and technology
- Rigorous supervision of the production process at every level
- Quality products and customer satisfaction
- Accurate control of different quality parameters such as temperature, humidity etc.
- Selection of appropriate distribution channel

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

The project is suggested to be located in or around a large city; since mushrooms are largely consumed by the urban population. The required agriculture inputs for mushroom farming are easily available in larger cities. Therefore, the proposed mushroom farm would ideally be located in or around major cities of Pakistan like Karachi, Lahore, Faisalabad, Islamabad, Peshawar, Quetta, Hyderabad, Rawalpindi, and other cities of Pakistan. These cities are also suitable due to the availability of good infrastructure and skilled personnel.

8. POTENTIAL TARGET MARKETS/CUSTOMERS

Pakistan is the fifth most populous country in the world, with 220 million people. Population is growing at around 2% per annum which keeps generating additional demand for food supply sources. Agriculture sector is very important to ensure food security and rural development in Pakistan. It contributes 22.7 percent to the GDP and provides employment to around 37.4 percent[7] of the labor force. Pakistan is a large producer of multitude of agricultural commodities and thus there is an abundant availability of agriculture waste materials like wheat straw, rice straw, cotton waste, etc. required for mushroom cultivation.

[7] https://www.finance.gov.pk/survey/chapter_22/PES02-AGRICULTURE.pdf

Market for mushrooms is growing in Pakistan because of their nice aroma, nutritious values, subtle flavor and special taste. Many exotic food preparations like soups, vegetables, pickles, etc. are made from them. They are also used for garnishing, to prepare many varieties of gravy and for stuffing several food preparations. The product can be sold even through departmental stores, super markets, etc. The people of Sindh, mostly of the desert and mountain (Thar and Kohistan) areas are familiar with the local desert mushroom, commonly known as Khumbhi. The people of the hilly areas of Gilgit Baltistan, Kashmir and Punjab are familiar with Black Morels. White umbrella type mushroom locally known as Khamiri is also eaten by people of Balochistan, Sindh and Punjab.

The international trade of mushrooms is reported under the vegetables category. Mushrooms are traded in four different forms fresh, provisionally preserved, dried and preserved other than acetic acid. The first three categories are classified under the main HS code 07 whereas the prepared/ preserved mushrooms are reported under HS 2003. Mushrooms of genus Agaricus (Button) are classified separately while all other types of mushrooms are classified under the other subcategory. Mushroom spawn is reported under the main HS code 0602. HS codes of mushrooms and mushroom spawn are shown in Table 9.

Table 9: HS Codes of Mushrooms and Mushroom Spawn

Fresh Mushrooms	
0709.51	Fresh Mushrooms of the genus Agaricus
0709.59	Fresh Mushrooms of other than genus Agaricus
Provisionally Preserved Mushrooms	
0711.51	Provisionally preserved Mushrooms of genus Agaricus
0711.59	Provisionally preserved Mushrooms of other than genus Agaricus
Dried Mushrooms	
0712.31	Dried Mushrooms of genus Agaricus
Prepared or Preserved Mushrooms other than Acetic Acid	
2003.10	Prepared Mushrooms of genus Agaricus
2003.90	Prepared Mushrooms of other genus Agaricus
Mushroom Spawn	
0602.9010	Mushroom spawn

During the year 2021, Pakistan exported fresh Genus Agaricus mushroom of trade value of USD 1.06 million and dried Genus Agaricus mushroom of trade value of USD 5.67 million under the HS code of 0709.5. The export value of fresh mushrooms other than Genus Agaricus was USD 0.54 million and of fresh mushroom other than Genus Agaricus was USD 0.54 million. Exports of dried mushroom other than Genus Agaricus

was USD 0.28 million under the HS code of 0712.3[8]. Pakistan exported most of its mushrooms to France, Hong Kong and South Korea.

Sale of mushrooms in the local market follows the traditional distribution channel, through middlemen or wholesalers at farms who identifies potential buyers and negotiate price, or sells directly to retailers in urban markets. The key factors in marketing are availability of current market information, quality of mushroom and supply and demand which determines the selling price.

Globally, mushrooms are traded mostly in processed form. However, fresh mushrooms are preferred over preserved ones in EU and American countries. Major exporting countries of fresh mushrooms are Netherlands, Poland, Ireland and Belgium. China is the largest exporter of preserved mushrooms with a market share of 42%. Netherlands (25%) and Spain (8%) are the other major countries. The major importing countries of prepared and preserved mushrooms are Germany, USA and France while those of fresh mushrooms are U.K, Germany, USA and France The world's total mushrooms production in the year 2020 was 14.79 million tons at the growth rate of 6.3%. The global mushroom market is projected to grow from 15.25 million tons in 2021 to 24.05 million tons in 2028 at a CAGR of 6.74% in forecast period.[9]

This is a very healthy growth rate that is indicative of the increasing demand of mushrooms in the global markets. Expansion of the hotel/restaurant/catering sector is increasing the demand for mushrooms swiftly in Pakistan and over the world. The rising adoption of mushrooms as a meat substitute, coupled with increasing vegan[10] populations is anticipated to further drive the market growth in forecasted period.

Incorporation of non-conventional crops in the existing agriculture system can help in improving the social as well as economic status of small farmers in Pakistan. Mushroom, which may be the first domesticated food crop, can be the best choice because it is one of the most economical crops. The increasing population demands constant and high food production. Mushroom technology can help in the production of increasing food demand for Pakistan where the annual population growth rate is about three percent.

[8] https://comtrade.un.org/data
[9] https://www.fortunebusinessinsights.com/industry-reports/mushroom-market-100197
[10] A vegan diet is based on plants (such as vegetables, grains, nuts and fruits) and foods made from plants.

9. PROJECT COST SUMMARY

A detailed financial model has been developed to analyze the commercial viability of mushroom farming. Various assumptions relevant to revenue and costs along with the results of the analysis are outlined in this section.

The projected Income Statement, Cash Flow Statement and Balance Sheet are attached as annexures of this document.

All the figures in this financial model have been calculated after carefully considering the relevant assumptions and target market.

9.1 Initial Project Cost

Table 10 provides fixed and working capital requirements for establishment of mushroom farming.

Table 10: Initial Project Cost estimates

Particulars	Cost (PKR)
Building / Infrastructure	405,397
Machinery & equipment	11,906,240
Office equipment	841,000
Tools and Equipment	3,701,560
Furniture & fixtures	1,750,000
Office vehicles	590,000
Pre-operating costs	600,000
Security against building	1,085,765
License costs[11]	50,000
Total Capital Cost - (A)	**20,929,962**
Equipment spare part inventory	99,219
Raw material inventory	56,700
Upfront building rent	200,000
Cash	1,000,000
Total – (B)	**1,355,918**
Total Project Cost - (A+B)	**22,285,881**

[11] The license is given by the Pakistan Halal Authority which are responsible for ascertaining the halal status of product process and services. It is not a statutory requirement; it is just taken to maintain the customer satisfaction in market

9.1.1. Land

The proposed unit will be established on a rented land having an area of 3,600 square feet (16 Marla). Total rental cost has been estimated as PKR 200,000. The breakup of the space requirement is provided in Table 11.

Table 11: Breakup of Space Requirement

Production Area	Number	Length (Ft)	Width (Ft)	Area (Sq. Ft.)
Admin Area	1	20	20	400
Raw Material Store	1	14	14	196
Compost Area	2	18	20	700
Water Reservoir	1	10	10	100
Compost Bunker	2	15	15	450
Pasturization Tunnel	2	15	15	450
Mushroom Production Hall	2	20	20	800
Washing & Packaging Area	1	10	20	200
Finished Goods Store	1	10	13	130
Kitchen	1	8	6	48
Washrooms	3	7	6	126
Total				**3,600**

9.1.2. Building/ Infrastructure

There will be no cost of building construction since the mushroom farming will be started in a rented building. However, there will be a renovation cost required to make the building usable for the business. Building rent of PKR 200,000 per month has been included in the operating cost. The proposed project requires electricity load of around 40.07 KW for which an industrial electricity connection will be required. Table 12 provide details of building renovation cost.

Table 12: Building Renovation Cost

Cost Item	Unit of Measurement	Total Units	Cost/Unit (PKR)	Total Cost (PKR)
Paint Cost	Liter	95	800	75,672
Labour Cost	Sq.Feet	9,459	15	141,885
Tile Cost	Sq.Feet	574	120	68,880
Labour Cost-Tile	Sq.Feet	574	40	22,960

PVC AC Control Curtains	Units	8	12,000	96,000
Total				**405,397**

9.1.3. Machinery and Equipment

Table 13 provides details of machinery and equipment for the proposed project.

Table 13: Machinery Cost Details

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Air Handling Units (5 Ton) (Button Mushroom)	1	1,882,100	1,882,100
Air Handling Units (5 Ton) (Oyster Mushroom)	1	1,882,100	1,882,100
Compost Turner	1	1,060,820	1,060,820
Weighing Scale (500kg)	1	20,060	20,060
Samll Weighing Scale (10 kg)	1	8,260	8,260
Blowers (3 & 5 Hp) (Button Mushroom)	2	325,000	650,000
Blowers (3 & 5 Hp) (Oyster Mushroom)	2	325,000	650,000
Steam Boiler (500L/H) (Button Mushroom)	1	600,000	600,000
Steam Boiler (500L/H) (Oyster Mushroom)	1	600,000	600,000
Water Pump	1	30,000	30,000
Cold Storage Chamber	1	623,000	623,000
Generator 50 KVA	1	1,000,000	1,000,000
Cling Film Packing Machine (30Pcs/Min)	1	1,539,900	1,539,900
Pasteurization Tunnel - Ducting and Piping System	2	80,000	160,000
Bunker - Ducting and Piping System	2	100,000	200,000
Mushroom Growing Room Ventilation & Installation System	2	500,000	1,000,000
Total			**11,906,240**

9.1.4. Office Equipment

Table 14 shows details of equipment cost required for the mushroom farm.

Table 14: Office Equipment Cost Details

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Air Conditioners	3	185,000	555,000
Laptops	5	125,000	625,000
Desktop Computer	4	60,000	240,000
Printer	1	50,000	50,000
Water Dispenser	2	25,000	50,000
Security System (6 Cams 2 MP)	16	4,000	64,000
LED/LCD TV	1	36,000	36,000
WI-FI/ Internet Connection	1	3,500	3,500
Ceiling Fan	8	8,500	68,000
Exhaust Fan	9	6,500	58,500
Total			**1,750,000**

9.1.5. Tools and Equipment

Table 15 shows details of tools and equipment required for the mushroom farm

Table 15: Tools and Equipment

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Electrician Kits	2	5,000	10,000
Steel Racks	20	25,000	500,000
Mushroom Humdifier	4	20,000	80,000
Total	**26**		**590,000**

9.1.6. Furniture and Fixtures

Table 16 shows details of furniture and fixture required for the mushroom farm.

Table 16: Furniture and Fixtures

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Executive Table	1	60,000	60,000
Executive Chair	1	30,000	30,000
Staff Chairs	29	14,000	406,000

Staff Table	6	30,000	180,000
Visitor Chairs	6	20,000	120,000
Sofa Set	1	45,000	45,000
Total			**841,000**

9.1.7. Office Vehicles

Table 17 provides details of the vehicles required along with their cost for the proposed project.

Table 17: Office Vehicle Cost Details

Cost Item	No.	Unit Cost (PKR)	Total (PKR)
Motorcycle	1	155,000	155,000
Hyundai Pickup + Reefer Container (Used)	1	3,500,000	3,500,000
Total	**2**		**3,655,000**

9.1.8. Pre-Operating Costs

Table 18 provides details of estimated pre-operating costs.

Table 18: Pre-Operating Cost Details

Costs Item	Cost (PKR)
Administration Expense	570,000
Utility expenses	515,765
Total Cost (PKR)	**1,085,765**

9.1.9. Security against Building

Table 19: Security against Building

Particular	Months	Rent per month (PKR)	Total (PKR)
Security against building	3	200,000	600,000
Total (PKR)			**600,000**

9.2 Breakeven Analysis

Table 20 shows calculation of break-even analysis.

Table 20: Breakeven Analysis

Particulars	Amount First Year (PKR)	Profitability Ratio
Sales (PKR) – A	37,345,284	100%
Variable Cost (PKR) – B	24,812,214	66%
Contribution (PKR) (A-B) = C	12,533,070	34%
Fixed Cost (PKR) – D	13,206,426	35%
Contribution Margin	34%	
Breakeven Analysis		
Breakeven Revenue (PKR)		39,351,710
Break-Even (Units)		106,290
Breakeven Capacity		74%

9.3 Revenue Generation

Table 21, Table 22 and Table 23 provides details regarding revenue generation from the mushroom farming wholesale and retail and from fertilizer or animal feed respectively during the first year of its operations.

Table 21: Revenue Details-Wholesale

Products	Number of Sales Mushroom Packets@ 70%	Price Per Packet (PKR)	Total Revenue (PKR)
Button Mushroom			
Packets 150 g	7,607	315	2,396,205
Packets 250 g	4,565	473	2,156,963
Packets 1000 g	1,522	1,785	2,716,770
Subtotal (A)	**13,694**		**7,269,938**
Oyster Mushroom			
Packets 150 g	16,301	242	3,936,692
Packets 250 g	9,781	368	3,594,518
Packets 1000 g	3,260	1365	4,449,900
Subtotal (B)	**29,342**		**11,981,109**
Total (A+B)	**43,036**		**19,251,047**

Table 22: Revenue Details-Retail

Products	Number of Sales Mushroom Packets@ 70%	Price Per Packet (PKR)	Total Revenue (PKR)
Button Mushroom			
Packets-150 g	5,071	473	2,396,048
Packets-250 g	3,043	683	2,076,848
Packets-1000 g	1,058	2,520	2,666,160
Subtotal (A)	**9,172**		**7,139,055**
Oyster Mushroom			
Packets-150 g	10,868	315	3,423,420
Packets-250 g	6,521	473	3,081,173
Packets-1000 g	2,174	1,785	3,880,590
Subtotal (B)	**19,563**		**10,385,183**
Total (A+B)	**28,735**		**17,524,238**

Table 23: Revenue-Fertilizer or Animal Feed

Mushroom Type	Total Bags of Both Mushrooms	Compost filled in a Bag (Kg)	Net Compost Filled Per Batch (Kg)	Annual Production Cycles	Annual Compost Filled (Kg)	Sale Price per Kg (PKR)	Revenue (PKR)
Button Mushroom	125	8	1,000	7	7,000	30	210,000
Oyster Mushroom	250	4	1,000	12	12,000		360,000
Total	**375**						**570,000**

Table 24: Compost Cost

Cost Item	Batch Size of Compost (Kg)	Material Introduce in One Batch of One Ton (Kg)	Price Per Kg (PKR)	Total Cost Per Batch (PKR)	Production Cycles	Total Annual Cost (PKR)
Button Mushroom						
Wheat Straw	1,000	1,000	35	35,000	7	245,000
Poultry Manure		400	25	10,000		70,000
Gypsum		70	45	3,150		22,050
Khal Choker		50	120	6,000		42,000
Subtotal (A)		**1,520**		**54,150**		**379,050**
Oyster Mushroom						
Wheat Straw	1,000	1,000	35	35,000	12	420,000
Khal Choker		50	120	6,000		72,000
Gypsum		7	45	315		3,780
Subtotal (B)		**1,057**		**41,315**		**495,780**
Total (A+B)						**874,830**
Total @ 70%						**612,381**

Table 25: Spawn Cost

Cost Item	No of Bags in One Batch	Quantity Filled in One Bag (Kg)	Quantity Filled in One Batch	Price Per Kg (PKR)	Total Cost Per Batch (PKR)	Production Cycle	Total Annual Cost (PKR)
Button Mushroom							
Spawn	125	0.05	6.3	1,700	10,625	7	74,375
Subtotal (A)					**10,625**		**74,375**
Oyster Mushroom							
Spawn	250	0.03	7.5	1,150	8,625	12	103,500
Subtotal (B)					**8,625**		**103,500**
Total (A+B)							**177,875**
Total @70%							**124,513**

Table 26: Other Material

Cost Item	No of Bags in One Batch	Quantity Filled in One Bag (Kg)	Quantity Filled in One Batch	Price Per Kg (PKR)	Total Cost Per Batch (PKR)	Production Cycle	Total Annual Cost (PKR)
Button Mushroom							
Peat Moss	125	0.02	2.5	470	1,175	7	8,225
Total					**1,175**		**8,225**
Total @70%							**5,758**

Table 27: PP Woven Sack Bag

Particular	Total Pasteurized Compost of Both Mushroom (Kg)	Total Pasteurized Compost Transferred to Production Hall (Kg)	Number of Bag Required to Transfer	Price Per Bag (PKR)	Total Number of Production Cycles	Total Cost(PKR)
Button & Oyster Mushroom (50Kg)	2,000	1,000	40	20	19	15,200
Total						**15,200**

Table 28: PP Plastic Bag

Particular	Number of Bags Required	Price Per Bag (PKR)	Total Number of Production Cycles	Total Cost (PKR)
Button Mushroom (8Kg)	125	25	7	21,875
Oyster Mushroom (4Kg)	250	15	12	45,000
Total	**375**			**66,875**

Table 29: Mushroom Punnet Tray

Packets	Sales Packet	Cost Per Packet (PKR)	Total Cost (PKR)
150 Gram	39,847	12	478,164
250 Gram	23,910	22	526,020
1000 Gram	8,014	55	440,770
Total	**71,771**		**1,444,954**

Table 30: Consumables

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Gardener Forks	5	1,200	6,000
Harvesting Baskets	15	600	9,000
Harvesting Knife	5	600	3,000
Formalin Solution (1L)	10	350	3,500
Watering Pipe 200 ft	2	9,600	19,200
Shrink Wrap Roll	200	200	40,000
Total			**80,700**

9.4 Financial Feasibility Analysis

The financial feasibility analysis provides the information regarding projected Internal Rate of Return (IRR), Net Present Value (NPV) and Payback period of the study, which is shown in Table 31.

Table 31: Financial Feasibility Analysis

Description	Project
IRR	27%
NPV (PKR)	2,046,698
Payback Period (years)	6.
Projection Years	10
Discount rate used for NPV	25%

9.5 Financial Feasibility Analysis with 50% Debt

The financial feasibility analysis provides the information regarding projected IRR, NPV and payback period of the study on the basis of Debt: Equity Model (50:50), which is shown in Table 32.

Table 32: Financial Feasibility Analysis with 50% Debt

Description	Project
IRR	26%
NPV (PKR)	576,589
Payback Period (years)	4.21
Projection Years	10
Discount rate used for NPV	26%

9.6 Human Resource Requirement

The proposed services shall require the workforce as provided in Table 33.

Table 33: Human Resource

Personnel	Number of Personnel	Salary per month per employee (PKR)
Production Manager	1	100,000
Horticulture Expert	2	100,000

Mechanical Technician	1	60,000
Quality Assurance Officer	1	60,000
Composting Labor (Semi-Skilled)	2	30,000
Steaming Process(Semi-Skilled)	2	30,000
Spawning & Casing(Semi-Skilled)	4	30,000
Harvesting(Semi-Skilled)	2	30,000
Washing & Packaging (Semi-Skilled)	2	35,000
Admin and Accounts Officer	1	60,000
Sales & Marketing Officer	1	80,000
Procurment Officer	1	50,000
Store Incharge	1	45,000
Driver	1	35,000
Office Boy	1	30,000
Security Guard	2	32,500
Sweeper	1	30,000
Total	**26**	

10. CONTACT DETAILS

The contact details of all the major suppliers of machinery & equipment and raw material are given in Table 34.

Table 34: Contact Details

Name of Supplier	Product	Contact	Website/Email
Guangzhou Air woods Environment Technology Co., Ltd.	Air Handling Unit (AHU)	+86-13302499811	http://www.airwoods.cn
Shandong Sunco Aet Co., Ltd	Compost Turner		http://www.sdnyzb.com
Dongguan Linyue Electric Technology Co., Ltd.	Blowers	+85-22815 0191	http://www.tslindustry.com
Zhangjiagang Wilford Thermal Co., Ltd.	Steam Boiler	+86 17701567985	http://www.wilfordboiler.com
Shanghai Kendall Electromechanical Equipment Co., Ltd.	Cold Storage Chamber	+86-18516660562	http://kendallcool.com
Henan Chanda Machinery Co.,Ltd	Cling Film Packing Machin	+86-18939535088	http://hnchanda.com
Fungi Ally	Spawn and Peat Moss		https://www.fungially.com/
Field & Forest Products	Spawn and Peat Moss	+800-792-6220	https://www.fieldforest.net/

11. USEFUL LINKS

Table 35: Useful Links

Name of Organization	E-mail Address
Small and Medium Enterprises Development Authority (SMEDA)	www.smeda.org.pk
National Business Development Program (NBDP)	www.nbdp.org.pk
Government of Pakistan	www.pakistan.gov.pk
Government of Punjab	www.punjab.gov.pk
Government of Sindh	sindh.gov.pk/
Government of Balochistan	balochistan.gov.pk/
Government of Khyber Pakhtunkhwa	kp.gov.pk/
Government of Gilgit Baltistan	gilgitbaltistan.gov.pk/
Government of Azad Jammu & Kashmir	ajk.gov.pk/
Trade Development Authority of Pakistan	www.tdap.gov.pk
Securities and Exchange Commission of Pakistan	www.secp.gov.pk
State Bank of Pakistan	www.sbp.gov.pk
Federal Board of Revenue	www.fbr.gov.pk
Federation of Pakistan Chambers of Commerce and Industry (FPCCI)	www.fpcci.com.pk
Pakistan Stock Exchange (PSX)	www.psx.com.pk
Pakistan Standards and Quality Control Authority (PSQCA)	http://www.psqca.com.pk
Punjab Small Industries Corporation	https://www.psic.gop.pk/
Sindh Small Industries Corporation	https://ssic.gos.pk/
Government of KPK	https://small_industries_de.kp.gov.pk/
Government of Balochistan Industries and Commerce	https://balochistan.gov.pk/departments-download/industries-and-commerce/
Ministry National Food Security & Research	https://mnfsr.trancemedia.pk/
Punjab Food Department	https://food.punjab.gov.pk/food_security
Sindh Food Authority	http://sfa.gos.pk/
KP Food Safety & Halal Food Authority	https://kpfsa.gov.pk/

Balochistan Food Authority	https://bfa.gob.pk/
Pakistan Food Association	https://www.confectioneryproduction.com/organisation/the-pakistan-food-association/
Horticultural Research Institute (HRI)	http://www.parc.gov.pk/index
Agri. Education Pakistan	https://agrieducation.pk/
University of Agriculture Faisalabad (UAF)	http://web.uaf.edu.pk/

12. ANNEXURES

12.1 Income Statement

Calculations

Income Statement **SMEDA**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Button Mushroom - Whole Sale	7,269,938	8,913,597	10,459,709	12,230,449	14,244,053	15,705,154	17,275,669	19,003,236	20,903,560	22,993,916
Oyster Mushroom-Whole Sale	11,981,109	14,694,083	17,244,204	20,157,241	23,480,259	25,888,062	28,476,869	31,324,556	34,457,011	37,902,712
Button Mushroom - Retail	7,139,055	8,751,146	10,270,976	12,002,718	13,986,478	15,419,369	16,961,306	18,657,436	20,523,180	22,575,498
Oyster Mushroom-Retail	10,385,183	12,736,647	14,944,256	17,468,816	20,351,920	22,440,464	24,684,510	27,152,961	29,868,257	32,855,083
Fertilizer or Animal Feed	570,000	627,000	689,700	758,670	834,537	917,991	1,009,790	1,110,769	1,221,846	1,344,030
Revenue	**37,345,284**	**45,722,474**	**53,608,846**	**62,617,895**	**72,897,246**	**80,371,040**	**88,408,144**	**97,248,958**	**106,973,854**	**117,671,240**
Cost of sales										
Compost Cost	612,381	722,172	847,862	991,540	1,155,552	1,271,877	1,399,913	1,540,838	1,695,949	1,866,674
Spawn Cost	124,513	146,836	172,392	201,605	234,953	258,605	284,638	313,291	344,829	379,542
Other Material	5,758	6,790	7,971	9,322	10,864	11,958	13,162	14,487	15,945	17,550
PP Woven Sack Bag	15,200	16,730	18,414	20,268	22,308	24,554	27,026	29,746	32,741	36,037
PP Plastic Bag	66,875	73,607	81,017	89,173	98,149	108,030	118,905	130,874	144,049	158,550
Mushroom Punnet Tray	1,444,954	1,773,010	2,081,898	2,435,101	2,838,403	3,131,407	3,446,635	3,793,596	4,175,485	4,595,817
Consumables	80,700	88,824	97,765	107,607	118,440	130,362	143,486	157,930	173,828	191,327
Direct Electricity Cost	5,186,723	5,655,430	6,166,493	6,723,738	7,331,340	7,993,848	8,716,226	9,503,882	10,362,716	11,299,160
Direct Labor	9,480,000	10,399,560	11,408,317	12,514,924	13,728,872	15,060,572	16,521,448	18,124,028	19,882,059	21,810,619
Gas Expense-Steam Boiler	1,120,359	1,509,756	1,948,361	2,504,881	3,209,635	3,894,932	4,715,724	5,709,485	6,912,663	8,369,392
Tractor Rental Cost	1,120,359	1,509,756	1,948,361	2,504,881	3,209,635	3,894,932	4,715,724	5,709,485	6,912,663	8,369,392
Generator Diesel Cost	2,617,920	2,881,457	3,171,524	3,490,791	3,842,197	4,228,978	4,654,695	5,123,268	5,639,010	6,206,671
Machinery Maintenance Cost	1,190,624	1,310,480	1,442,402	1,587,604	1,747,422	1,923,330	2,116,945	2,330,050	2,564,609	2,822,780
Total cost of sales	23,066,364	26,094,409	29,392,777	33,181,435	37,547,770	41,933,386	46,874,526	52,480,961	58,856,547	66,123,510
Gross Profit	14,278,920	19,628,065	24,216,069	29,436,460	35,349,476	38,437,654	41,533,618	44,767,998	48,117,307	51,547,729
General administration & selling expenses										
Management Staff	4,740,000	5,199,780	5,704,159	6,257,462	6,864,436	7,530,286	8,260,724	9,062,014	9,941,029	10,905,309
Administration benefits expense	711,000	779,967	855,624	938,619	1,029,665	1,129,543	1,239,109	1,359,302	1,491,154	1,635,796
Building rental expense	2,400,000	2,640,000	2,904,000	3,194,400	3,513,840	3,865,224	4,251,746	4,676,921	5,144,613	5,659,074
Indirect Electricity Cost	1,002,461	1,093,050	1,191,825	1,299,527	1,416,960	1,545,006	1,684,623	1,836,857	2,002,848	2,183,839
Communications expense (phone, mail, internet, etc.)	568,800	623,974	684,499	750,895	823,732	903,634	991,287	1,087,442	1,192,924	1,308,637
Office vehicles running expense	608,250	669,481	736,875	811,054	892,700	982,565	1,081,476	1,190,345	1,310,173	1,442,064
Office expenses (stationery, entertainment etc.)	568,800	623,974	684,499	750,895	823,732	903,634	991,287	1,087,442	1,192,924	1,308,637
Promotional expense	1,493,811	1,828,899	2,144,354	2,504,716	2,915,890	3,214,842	3,536,326	3,889,958	4,278,954	4,706,850
Amortization of Legal, Licensing, and Training costs	5,000	5,000	5,000	5,000	5,000	2,500	2,500	2,500	2,500	2,500
Depreciation expense	2,263,548	2,263,548	2,263,548	2,263,548	2,263,548	2,263,548	1,919,420	2,981,610	2,981,610	2,981,610
Amortization of pre-operating costs	216,653	216,653	216,653	216,653	216,653	-	-	-	-	-
Bad debt expense	373,453	457,225	536,088	626,179	728,972	803,710	884,081	972,490	1,069,739	1,176,712
Subtotal	14,951,776	16,401,549	17,927,124	19,618,948	21,495,129	23,144,493	24,842,579	28,146,881	30,608,468	33,311,029
Operating Income	(672,856)	3,226,516	6,288,945	9,817,512	13,854,347	15,293,161	16,691,039	16,621,117	17,508,839	18,236,700
Gain / (loss) on sale of office equipment	-	-	-	-	-	-	437,500	-	-	
Gain / (loss) on sale of office vehicles	-	-	-	-	-	-	925,390	-	-	
Earnings Before Interest & Taxes	(672,856)	3,226,516	6,288,945	9,817,512	13,854,347	15,293,161	18,053,929	16,621,117	17,508,839	18,236,700
Earnings Before Tax	(672,856)	3,226,516	6,288,945	9,817,512	13,854,347	15,293,161	18,053,929	16,621,117	17,508,839	18,236,700
Tax	-	532,954	1,566,130	2,801,129	4,214,021	4,717,606	5,683,874	5,182,390	5,493,093	5,747,844
NET PROFIT/(LOSS) AFTER TAX	**(672,856)**	**2,693,561**	**4,722,815**	**7,016,384**	**9,640,326**	**10,575,556**	**12,370,054**	**11,438,727**	**12,015,746**	**12,488,856**

12.2 Balance Sheet

Calculations **SMEDA**

Balance Sheet

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets											
Current assets											
Cash & Bank	1,000,000	894,426	4,651,910	8,573,845	12,649,104	16,933,609	20,352,745	22,427,992	36,230,830	50,526,616	66,639,240
Accounts receivable	-	1,021,536	1,252,652	1,469,976	1,718,312	2,001,742	2,207,029	2,427,732	2,670,505	2,937,556	3,231,311
Equipment spare part inventory	99,219	119,654	144,299	174,019	209,860	253,084	305,210	368,072	443,882	535,306	-
Raw material inventory	56,700	73,596	95,103	122,415	157,026	190,231	230,459	279,194	338,234	409,759	-
Finished goods inventory		961,099	1,087,267	1,224,699	1,382,925	1,564,490	1,747,224	1,953,105	2,186,707	2,452,356	2,755,146
Pre-paid building rent	200,000	220,000	242,000	266,200	292,820	322,102	354,312	389,743	428,718	471,590	-
Total Current Assets	1,355,918	3,290,311	7,473,231	11,831,154	16,410,046	21,265,259	25,196,980	27,845,839	42,298,876	57,333,183	72,625,698
Fixed assets											
Building Infrastructure Renovation	405,397	364,857	324,318	283,778	243,238	202,699	162,159	121,619	81,079	40,540	-
Machinery & equipment	11,906,240	10,715,616	9,524,992	8,334,368	7,143,744	5,953,120	4,762,496	3,571,872	2,381,248	1,190,624	-
Furniture & fixtures	841,000	714,850	588,700	462,550	336,400	210,250	84,100	1,594,209	1,355,077	1,115,946	876,815
Office vehicles	3,701,560	3,146,326	2,591,092	2,035,858	1,480,624	925,390	370,156	5,639,705	4,793,750	3,947,794	3,101,838
Office equipment	1,750,000	1,487,500	1,225,000	962,500	700,000	437,500	175,000	3,317,319	2,819,721	2,322,123	1,824,525
Tools & Equipment	590,000	501,500	413,000	324,500	236,000	147,500	59,000	1,118,410	950,649	782,887	615,126
Security against building	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000
Total Fixed Assets	19,794,197	17,530,649	15,267,102	13,003,554	10,740,006	8,476,459	6,212,911	15,963,134	12,981,524	9,999,914	7,018,304
Intangible assets											
Pre-operation costs	1,083,265	866,612	649,959	433,306	216,653	-	-	-	-	-	-
Legal, licensing, & training costs	50,000	45,000	40,000	35,000	30,000	25,000	22,500	20,000	17,500	15,000	137,168
Total Intangible Assets	1,133,265	911,612	689,959	468,306	246,653	25,000	22,500	20,000	17,500	15,000	137,168
TOTAL ASSETS	**22,283,381**	**21,732,572**	**23,430,292**	**25,303,015**	**27,396,706**	**29,766,717**	**31,432,391**	**43,828,973**	**55,297,900**	**67,348,096**	**79,781,169**
Liabilities & Shareholders' Equity											
Current liabilities											
Accounts payable		122,048	136,559	153,050	171,841	192,431	215,780	242,308	272,508	306,958	251,176
Total Current Liabilities	-	122,048	136,559	153,050	171,841	192,431	215,780	242,308	272,508	306,958	251,176
Other liabilities											
Total Long Term Liabilities	-	-	-	-	-	-	-	-	-	-	-
Shareholders' equity											
Paid-up capital	22,283,381	22,283,381	22,283,381	22,283,381	22,283,381	22,283,381	22,283,381	22,283,381	22,283,381	22,283,381	22,283,381
Retained earnings		(672,856)	1,010,353	2,866,584	4,941,484	7,290,905	8,933,230	21,303,285	32,742,011	44,757,757	57,246,613
Total Equity	22,283,381	21,610,524	23,293,733	25,149,964	27,224,864	29,574,286	31,216,611	43,586,665	55,025,392	67,041,138	79,529,994
TOTAL CAPITAL AND LIABILITIES	**22,283,381**	**21,732,572**	**23,430,292**	**25,303,015**	**27,396,706**	**29,766,717**	**31,432,391**	**43,828,973**	**55,297,900**	**67,348,096**	**79,781,169**

12.3 Cash Flow Statement

Calculations **SMEDA**

Cash Flow Statement

		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating activities												
Net profit			(672,856)	2,693,561	4,722,815	7,016,384	9,640,326	10,575,556	12,370,054	11,438,727	12,015,746	12,488,856
Add: depreciation expense			2,263,548	2,263,548	2,263,548	2,263,548	2,263,548	2,263,548	1,919,420	2,981,610	2,981,610	2,981,610
amortization of pre-operating costs			216,653	216,653	216,653	216,653	216,653	-	-	-	-	-
amortization of License Cost			5,000	5,000	5,000	5,000	5,000	2,500	2,500	2,500	2,500	2,500
Accounts receivable			(1,021,536)	(231,116)	(217,324)	(248,336)	(283,430)	(205,287)	(220,703)	(242,773)	(267,051)	(293,756)
Finished goods inventory			(961,099)	(126,169)	(137,432)	(158,226)	(181,566)	(182,734)	(205,881)	(233,601)	(265,649)	(302,790)
Equipment inventory		(99,219)	(20,435)	(24,644)	(29,720)	(35,842)	(43,224)	(52,126)	(62,862)	(75,810)	(91,424)	535,306
Raw Material Iventory	-	(56,700)	(16,896)	(21,507)	(27,312)	(34,610)	(33,206)	(40,228)	(48,735)	(59,040)	(71,525)	409,759
Pre-paid building rent	-	(200,000)	(20,000)	(22,000)	(24,200)	(26,620)	(29,282)	(32,210)	(35,431)	(38,974)	(42,872)	471,590
Accounts payable			122,048	14,511	16,491	18,791	20,590	23,349	26,528	30,200	34,450	(55,783)
Cash provided by operations		(355,918)	(105,574)	4,767,837	6,788,519	9,016,742	11,575,410	12,352,367	13,744,890	13,802,838	14,295,786	16,237,292
Financing activities												
Issuance of shares		22,283,381	-	-	-	-	-	-	-	-	-	-
Purchase of (treasury) shares												
Cash provided by / (used for) financing activities		22,283,381	-	-	-	-	-	-	-	-	-	-
Investing activities												
Capital expenditure		(20,927,462)	-	-	-	-	-	-	(11,669,643)	-	-	(124,668)
Acquisitions												
Cash (used for) / provided by investing activities		(20,927,462)	-	-	-	-	-	-	(11,669,643)	-	-	(124,668)
NET CASH		1,000,000	(105,574)	4,767,837	6,788,519	9,016,742	11,575,410	12,352,367	2,075,247	13,802,838	14,295,786	16,112,624

13. KEY ASSUMPTIONS

13.1 Operating Cost Assumptions

Table 36: Operating Cost Assumptions

Description	Details
Operating costs growth rate	10.1%
Electricity growth rate	9.0%
Water price growth rate	9.0%
Gas price growth rate	9.0%
Wage growth rate	9.7%
Office equipment price growth rate	9.6%
Office vehicles price growth rate	6.2%

13.2 Revenue Assumptions

Table 37: Revenue Assumptions

Description	Details
Sale price growth rate	10%
Capacity utilization	70%
Capacity utilization growth rate	5%
Maximum capacity	90%

13.3 Financial Assumptions

Table 38: Financial Assumptions

Description	Details
Project life (Years)	10
Debt: Equity	0:100
Discount Rate	25%

13.4 Debt Related Assumptions

Table 39: Debt Related Assumption

Description of Cost	Details
Project Life (Years)	10
Debt: Equity	50:50
Discount Rate	26%
Debt Grace Period	1 Years
Interest Rate	26%

13.5 Cash Flow Assumptions

Table 40: Cash Flow Assumptions

Description	Details
Accounts receivable cycle (in days)	10
Accounts payable cycle (in days)	30

Small and Medium Enterprises Development Authority

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

www.smeda.org.pk, **helpdesk@smeda.org.pk**

REGIONAL OFFICE PUNJAB	REGIONAL OFFICE SINDH	REGIONAL OFFICE KPK	REGIONAL OFFICE BALOCHISTAN
3rd 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	5TH Floor, Bahria Complex II, M.T. Khan Road, Karachi. Tel: (021) 111-111-456 Fax: (021) 5610572 helpdesk-khi@smeda.org.pk	Ground Floor State Life Building The Mall, Peshawar. Tel: (091) 9213046-47 Fax: (091) 286908 helpdesk-pew@smeda.org.pk	Bungalow No. 15-A Chaman Housing Scheme Airport Road, Quetta. Tel: (081) 831623, 831702 Fax: (081) 831922 helpdesk-qta@smeda.org.pk