



Pre-feasibility Study

GLASS MANUFACTURING UNIT

May 2021

“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, and revenues 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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1. DISCLAIMER

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2. EXECUTIVE SUMMARY

Glass is a versatile material, which has been in use in construction since ancient times. Nowadays, glass is used extensively in façade¹, interior partitions, balustrades², railings for stairs and balconies, etc. Glass is extensively used in facades of high-rise buildings, to make them look more attractive. After the 19th century, a revolution in the glass industry started with the invention of float method for production of glass. Float glass is the normal or ordinary glass that is now widely produced and used in daily life. It is also known as flat glass or annealed glass. The name “float” is given to the glass due to its method of production. Worldwide, 90% of the glass is produced by floating method.

Float glass is most commonly used in glass windows and is also sometimes called window glass. Clear float glasses are highly popular in the construction of architectural exteriors and interiors of the building. It has wide application in residential structures. Float glass is used in doors, windows, tabletops, stairs, bottles, glass partitions, and furniture articles.

This “Pre-feasibility Document” provides details for setting up a Glass Manufacturing Unit, which has an installed capacity of producing 15.77 million square feet glass in a year at a maximum capacity of 100%. Initial capacity utilization in the first year of operations has been assumed to be 50%, which translates into production of 7.88 million sq. feet glass annually.

The unit is proposed to be ideally located in the cities of Pind Dadan Khan, Khewra, Sheikhpura, Chakwal and DG Khan in Punjab. Sukkur and Hyderabad in Sindh. Haripur, Nowshera and Kohat in KPK. Quetta, Kalat and Harnai in Balochistan. These cities are selected because of the proximity to the raw material sources. It makes the procurement of raw material cost efficient and effective. Another reason is the availability of the low-cost skilled labor willing to work in extreme temperatures of glass manufacturing unit. The city of Sheikhpura is one of the most suitable cities to establish a glass manufacturing setup as that city has already existent large glass manufacturing units; so, the acquisition of work force becomes easy.

A processing unit will be set up in a constructed building with area of 90,000 square feet (20 Kanals). The project requires a total investment of PKR 713.7 million. This includes capital investment of PKR 696.88 million and working capital of PKR 16.82 million. It is proposed that the project shall be financed through 100% equity. The Net Present Value (NPV) of project is PKR 752.12 million with an Internal Rate of Return (IRR) of 30% and a Payback period of 4.11 years. Further, this project is expected to generate Gross Annual Revenues of PK 377.78 million during 1st year, Gross Profit (GP) ratio ranging from 55% to 65% and Net Profit (NP) ratio ranging from 20% to 35% during the projection period of ten years. The proposed project will achieve its

¹ The principal front of a building, that faces on to a street or open space.

² Balustrades are panels that provide a barrier or fence, sometimes with supporting posts (balusters). Their primary purpose is usually as a safety barrier, whereas secondary purpose is for beautification of the indoors and outdoors. They have the benefit of not blocking the light in a building.

estimated breakeven point at capacity of 21.22% (3,346,536 square feet) with annual breakeven revenue of PKR 167.33 million.

The proposed project may also be established using leveraged financing. At 50% financing at a cost of KIBOR+3%, the proposed business provides Net Present Value (NPV) of PKR 1,190 million, Internal Rate of Return (IRR) of 30% and Payback period of 4.08 years. Further, this project is expected to generate Net Profit (NP) ratio ranging from 13% to 35% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 30.63% with breakeven revenue of PKR 241.46 million (Break even units 4,829,319).

The proposed project will provide employment opportunities to 67 people. High return on investment and steady growth of business is expected with the entrepreneur having some prior experience or education in the related field of business. The legal business status of this project is proposed as "Company". Further, the proposed project may also be established as a "Partnership Concern".

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.

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 is 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 provide information to the potential investors about "Glass Manufacturing Unit". The document provides a general understanding of the business to facilitate potential investors in crucial and effective 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 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

Float glass is normal or ordinary glass which is now widely produced and used in daily life. Float glass is also known as flat glass or annealed glass. According to the requirements of the final use, float glass can be processed to produce different types of glass. Float glass itself has transparent, flat and smooth surface. It has a natural greenish hue or colour. It transmits 87% of the light, which is incident on it. It can be coated with different metal oxides to produce tinted glass. It can withstand the effect of the chemical reaction under different environmental conditions or acidic effects. Float glass comes with less or no optimal distortion and provides a clear view, unlike sheet glass.

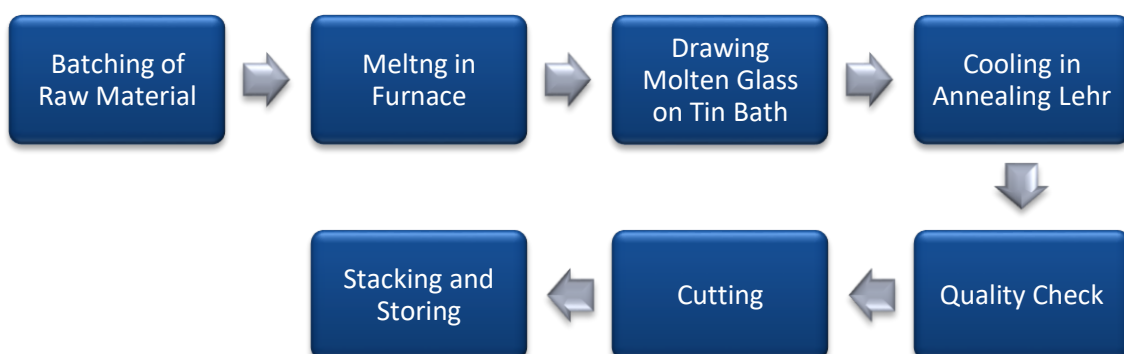
The raw material used to make clear float glass is sand, soda ash, dolomite, limestone and salt cake. These materials are melted in a furnace and upon mixing they form molten glass. This molten glass is passed through the bed of molten tin. Tin is the only metal which remains stable in a liquid state at 600°C, which is the temperature of the molten glass. As glass has less density as compared to that of tin, it floats above the tin. The floating molten glass is then passed through the temperature-controlled kiln (annealing lehr) for cooling the glass. In annealing lehr, glass cools gradually and comes out with uniform thickness and flat surface. According to the customers' requirements, the glass sheets are cut and transported.

The proposed unit is based on one tank furnace, ten conveyor belts, one cooling machine, two cutters, five weighing bridges, three overhead cranes, two fork lifters, one tube well, two furnace oil tanks, one compressor, two chillers, one cooling tower, one backup generator and one water treatment plant

5.1. Production Process Flow

The production process flow of Glass Manufacturing is shown in Figure 1.

Figure 1: Manufacturing Process Flow of Glass



The brief description of process flow is as follows:

Batching of Raw Material

Depending upon the type of glass to be manufactured, suitable raw materials are procured. Figure 2 shows raw materials used in manufacturing of Float Glass.

Figure 2: Raw Material Used in Glass Manufacturing



The raw materials are accurately weighed in correct proportions before they are mixed together. The mixing of these materials is carried out in mixing machines until a uniform mixture is obtained. Such a uniform mixture is known as the batch or frit and it is taken for further process of melting in a furnace. The raw materials used for Float Glass, along with their chemical names and formulas and their compositions, is shown in Table 1.

Table 1: Raw Material Composition

Material	Chemical Name	Chemical Formula	Material Composition
Sand (Silica)	Silicon Dioxide	(SiO ₂)	72.60%
Soda Ash	Sodium Carbonate	(Na ₂ CO ₃)	13%
Limestone	Calcium Carbonate	CaCO ₃	8.40%
Dolomite	Calcium Magnesium Carbonate	CaMg(CO ₃) ₂	4%
Alumina	Aluminium Oxide	Al ₂ O ₃	1%
Colour/Refining Agents	-		1%
Total			100%

The raw materials generally contain traces of iron compounds. The ferrous oxide imparts a green color to glass and ferric oxide imparts a very light-yellow tint. To avoid such effects, refining agents or de-colorizers are added in the mixture.

Melting of Raw Materials in Tank Furnace:

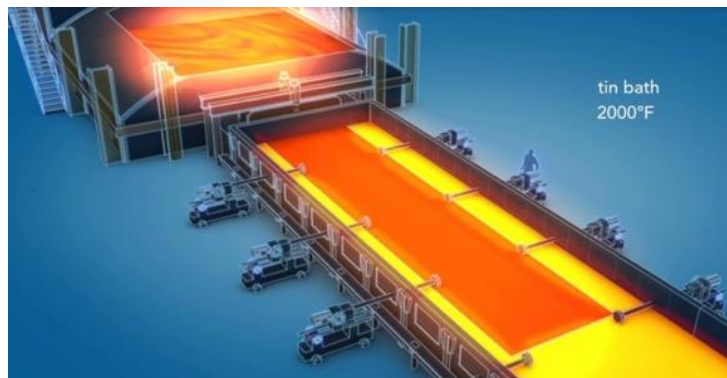
The batched raw materials pass from the mixing silo to a five-chambered tank furnace where they become molten. The fuel used for heating the furnace is natural gas. Temperatures in the furnace reach up to 1600°C. Heating is continued until the evolution of carbon dioxide, oxygen, sulphur dioxide and other gases stops. When the mass has melted down, it is removed from the furnace manually by silicon carbide rods and is moved to the next operation. Figure 3 shows labors wearing safety gear and removing the molten glass from the furnace by using silicon carbide rods.

Figure 3: Removing Molten Glass



Drawing Molten Glass on Tin Bath

The molten glass is then "floated" onto a bath of molten tin at a temperature of about 1050°C. It forms a "ribbon", which is passed through rotating rollers. The roller helps the molten glass to spread in the form of a thin sheet and controls the thickness of the glass sheet. The glass, which is highly viscous, and the tin, which is very fluid, does not mix and the contact surface between these two materials is perfectly flat, giving the term "flat" glass to the final product. Figure 4 shows drawing of molten glass on tin bath and Figure 5 shows molten glass floating on a molten tin bath and becoming a flat ribbon.

Figure 4: Drawing Molten Glass on Tin Bath**Figure 5: Molten Glass Floating on Tin Bath**

In another method, the molten mass of glass is poured on a flat iron-casting table and it is then turned flat with the help of heavy iron rollers.

Cooling in Annealing Lehr

Glass leaves the bath of molten tin, at a temperature of 600°C. Once the glass takes its proper shape, it is polished with fire. It is important to remember that only the upper surface i.e., which is also known as the airside or score side, is fire-polished and the lower surface i.e., the tin side is set to cool. For the cooling process, the glass is moved from the chamber to a temperature-controlled oven called Lehr. In this kiln, the glass is cooled slowly at a specific rate, in a process known as annealing. Through this process, the glass is relieved of all internal stresses to create a sturdy, uniform and smooth sheet of float glass. Establishing the right rate of cooling is a crucial step in the manufacturing process as wrong temperatures can result in the formation of air bubbles and internal stresses. Once the glass is removed from the Lehr, it emerges as a continuous ribbon at room temperature, which is flat, has a fire-finished topcoat, and possesses smooth, parallel surfaces. The glass is then finished to perfection with automatic cutters that trim edges and cut the glass into the desired length. It can have

a thickness range of anywhere between 0.4mm to 25 mm, depending on the requirements.

Figure 6 shows temperatures at different stages of glass production and Figure 7 shows annealing of float glass in annealing lehr.

Figure 6: Temperatures at different Stages

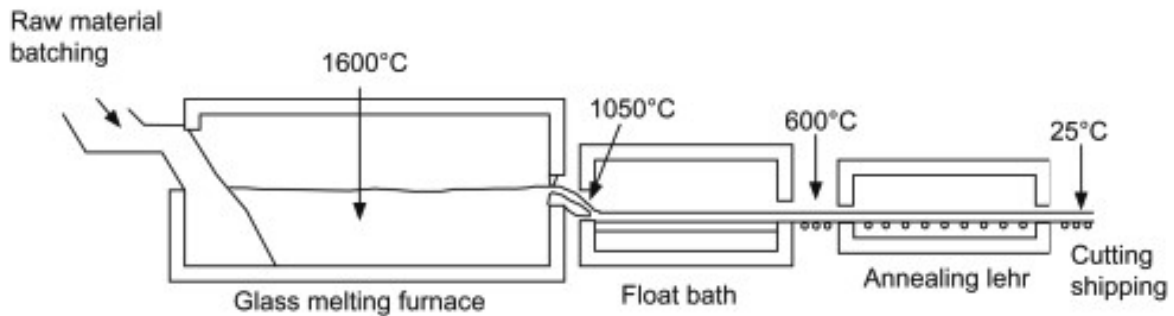
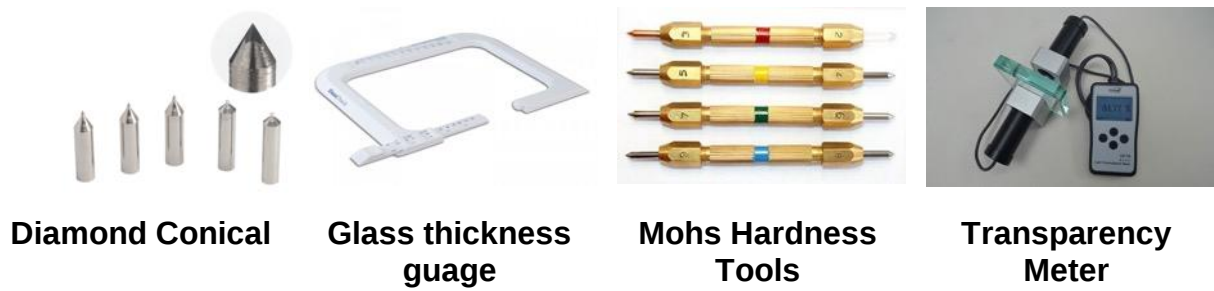


Figure 7: Cooling in Annealing Lehr



Quality Check

After cooling, the glass undergoes to rigorous quality checks. Glass is inspected manually to monitor overall physical surface properties such as thickness, hardness transparency and resistance to scratches. Thickness is checked by glass thickness gauge; hardness is checked by the conical diamond; transparency is checked transparency meter also called clarity meter and testing for scratches is done by Mohs hardness tools. These instruments are part of the quality assurance lab.

Figure 8: Instruments used to Test Glass Quality**Cutting and Storage**

The final step is the cutting of glass by the glass cutters. They are cut in different sizes as required by the consumers. Any waste material that has been cut out due to imperfections is fed right back into the furnace as cullet. Fork lift is used to stack the glasses for storage.

Figure 9: Glass Cutter**Figure 10: Stacked Float Glass**

5.2. Handling and Safety

Glass manufacturing involves melting of glass at high temperatures of 1600°C. Therefore, the handling of the glass and safety of the workers become critically important. Following are the safety instructions that must be complied by the workers:

- Always wear safety glasses with side shields and gloves when moving or handling glass.
- Inspect the glass before moving it to assure there isn't any damage that may cause spontaneous glass breakage.
- Use proper lifting and moving techniques. Hold the glass firmly in hands. Do not carry it over the head or under the arms.
- Do not let any surface bump or hit the glass edges or corners.
- When setting glass on the floor, or other any other surface, gently place it down on the long edge.
- Do not place glass directly on hard surfaces. Instead, use padding, or another type of cushioning agent.
- Wrap or cover glass in blankets, or other cushioning agents, to protect it against incidental bumps that could cause chips or scratches.
- Carry only one piece of glass at a time.
- Have two or more people or utilize lift-assist devices when handling large pieces of glass, as a way to reduce any shear stress in the material.

5.3. Benefits and Applications of Float Glass

Float glass is a popular product due to its following benefits:

Durability

Float glass is treated and cured in an oven to gain strength and durability. Despite it being more substantial than plate glass, it has the same amount of thickness, thereby revealing its incredible density and making it the superior glass for designing one's space's interior and exteriors.

Environment-Friendly

Energy-efficiency refers to the ability of glass to regulate indoor temperature by keeping the interiors relatively cool during summers and warm during winters. One can also design a low-E glass³ from float glass by coating it with metal oxides. Clear Float Glass is also 100% recyclable and non-toxic. It ensures that there is no carbon footprint.⁴ It is also designed to be copper and lead-free for environmental preservation.

³ E glass has low electrical conductivity as it is used for insulation.

⁴ The amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organization, or community.

Multitude of Options

Float glass can be diversified to create a wide variety of glass products. It can be designed with varying thickness, shades, and sizes to suit a myriad of architectural and consumer requirements.

Wide Applications of Float Glass

From domestic housing to commercial uses, float glass is a versatile item that serves many purposes. Some of the creative ways to use float glass in residential and commercial spaces are as follows:

- **Displays:** Owing to its crystal-clear transparency, float glass serves as the ideal choice for displaying items. They can be used for showroom display cases, retail shop windows, and countertops to protect valuable items such as expensive watches, jewelry and so on and yet be able to showcase the beauty of the unique products effortlessly.

Figure 11: Glass Display

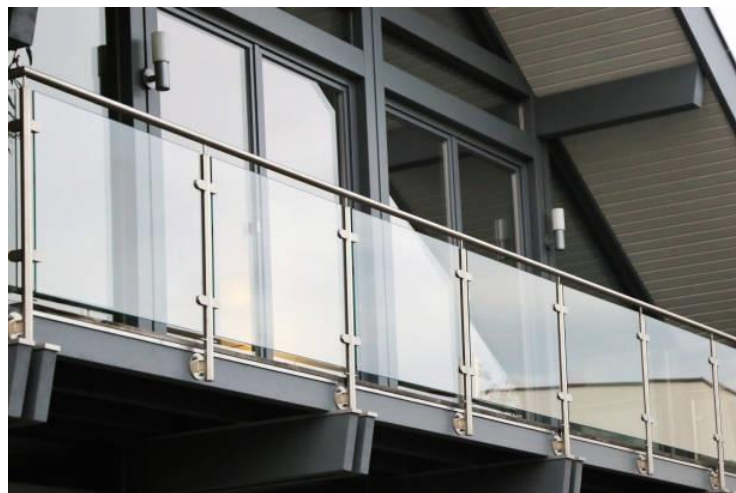


- **Facades:** Towering and glistening skyscrapers are made from glass processed with glazing⁵ to create the perfect structure, which is just as aesthetic as it is functional. The glazing makes the glass tougher and increases its efficiency.

⁵ The word glazing refers to the glass that is installed in the window frame (the term is also used to describe the work done by a glazier). One sheet of glass is a single glazed window; two glass panels create a double-glazed window and so on.

Figure 12: Glass Facades

- **Glass Balustrades:** Glass balustrades are panels that provide a barrier or fence, sometimes with supporting posts (balusters). They are typically used on balconies, staircases, terraces or decking areas. While their primary purpose is usually as a safety barrier, glass balustrades are increasingly used to add sophistication and a contemporary style, both indoors and outdoors.

Figure 13: Glass Balustrades

- **Wall Panels:** Whether it is for creating partitions in one's home or personal cabin in the office, Wall panels increase the visual appeal of the spaces.

Figure 14: Glass Panel Walls

5.4. Installed and Operational Capacities

The proposed manufacturing unit, at maximum capacity of 85%, will produce 15.7 million sq. feet glass annually. The unit would operate for 24 hours per day, working in three shifts per day for 365 working days in a year. It is assumed that the unit will attain a capacity utilization of 50% during the first year of operations and the utilization will increase by 5% each year to reach a maximum of 85% in eighth year.

Table 2 depicts the installed and operational capacities of the proposed unit for the initial year.

Table 2: Installed and Operational Capacity

Product	Furnace Capacity per day (ton)	Production per Day (sq. ft.)	Total Annual Installed Capacity (Sq. ft.)	Initial Operational Capacity	Operational Capacity @ 50%
Float Glass	50	43,200	15,768,000	50%	7,884,000

6. CRITICAL FACTORS

The following factors may be taken into account while making investment decision:

- Technical know-how and basic knowledge of the plant and materials
- Employment of specialized and skilled workforce
- Arrangement of high-quality safety gears for the workers
- Strict compliance of the safety measures
- Rigorous supervision of the processing at every level
- Production of a quality product, specific to user's need and satisfaction
- Up-to-date knowledge of new market trends and new technology

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

For the success of this manufacturing plant, it is necessary to determine the geographical potential for this business. The cities like Pind Dadan Khan, Khewra,, Sheikhpura, Chakwal, DG Khan of Punjab. Sukkur and Hyderabad of Sindh, Haripur, Nowshera, and Kohat of KPK. Quetta, Kalat and Harnai of Balochistan are suitable for the investment because of their proximity to the raw materials like dolomite, soda ash, sand, lime stone and alumina. It makes their procurement cost efficient and effective. Another reason is the availability of the low-cost skilled labor willing to work in extreme temperatures of glass manufacturing unit.

The city of Sheikhpura is one of the most suitable cities to establish a glass manufacturing setup as that city has already existent large glass manufacturing units; so, the acquisition of work force becomes easy. The machinery equipment and the manufacturing setup can also be easily installed in this city, as their suppliers are almost the same for different glass manufacturers.

8. POTENTIAL TARGET MARKETS

Some of the main applications of float glass are in follows:

- Architecture
- Automobiles
- Mirrors
- Furniture
- Insulating glass types / multi-sheet glass
- Single glazing
- Window glass
- Electronic machines
- Medical equipment
- Optical instruments

Float glass has multiple uses. Its main application is in the construction of commercial buildings and houses. It is used in the windows of the houses, buildings and cars because of its scratch-less quality. It is used in making of glass walls, glass balustrades, glass doors of buildings and houses. It is also used in making glass tabletops and can further be processed to be used in the tableware. As per the current trend, glass top table is the preferred choice compared to a wooden top table in the homes. With advancements in technology, other applications of float glass have increased to an extent that now ultra-thin float glass is used in electronics such as the screens of TV, computer, laptop, smartphones and tablets.

Because of its wide range of industrial uses, the main potential target markets are industries; including building manufacturers, houses manufacturers, glass doors and windows manufacturers, car manufacturers, glass table and tableware manufacturers, manufacturers of all the electronics having screens like TV, computer laptop, smartphones tablets and medical equipment like ultrasound machines.

Pakistan and China have signed a deal according to which China will establish a 200 million USD⁶ Glass Manufacturing Complex in Pakistan for the production of export quality Float Glass. This will further increase the quality and quantity of export by Pakistan.

Pakistan is also an exporter of float glass. According to UN Comtrade data, Pakistan exported around USD 37 million worth of glass during the last 5 years against HS code 7005. Details of exports are shown in Table 3.

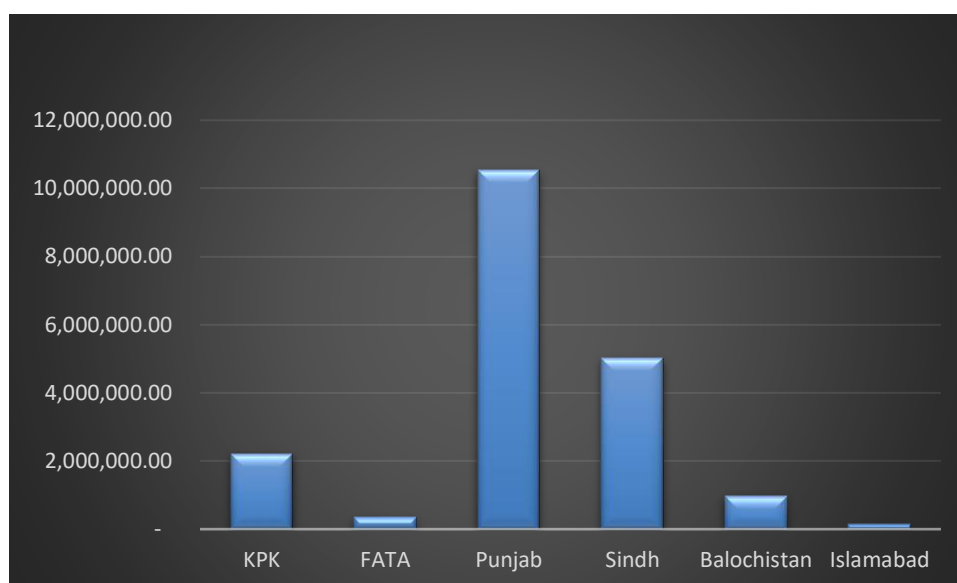
Table 3: Export of Float Glass by Pakistan

Year	Net Weight (kg)	Export Value (USD)
2016	6,483,736	7,841,825
2017	7,206,314	5,819,508
2018	6,639,169	5,394,970
2019	12,624,174	7,966,161
2020	8,432,783	10,511,235
Total	41,386,176	37,533,699

The top destinations of float glass exported by Pakistan are Afghanistan, Bangladesh and Tanzania. Pakistan also exports glassware products made of float glass to the United Arab Emirates, Iran, South Africa, Philippines, Oman, Bangladesh and Belgium.

According to the Pakistan Bureau of Statistics, there are around 19 million housing units in Pakistan whereas the population of Pakistan is over 220 million. The population growth rate is around 2% annually. Increasing population lead to generating demand for new houses that eventually increases the demand for construction materials; including float glass. The graph in Figure 15 shows the number of household units in Pakistan province/administrative units wise according to Pakistan Bureau of Statistics.

⁶<https://tribune.com.pk/story/1834085/2-joint-venture-pakistan-china-firms-build-200m-glass-manufacturing-complex>

Figure 15: No. of Household Units - Province Wise

9. PROJECT COST SUMMARY

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

The projected Income Statement, Cost of Goods Sold, Cash Flow Statement and Balance Sheet are attached as Annexure.

9.1. Project Economics

All the figures in this financial model have been calculated after carefully taking into account the relevant assumptions and the target market

9.1.1. Financial Feasibility Analysis

The financial feasibility analysis, given in Table 4, provides the information regarding projected IRR, NPV and payback period of the study based on 100% equity.

Table 4: Financial Feasibility Analysis

Description	Values
IRR	30%
NPV (PKR)	752,122,878
Payback Period (years)	4.11
Projection Years	10
Discount Rate used for NPV	15%

9.1.2. Financial Feasibility Debt Financing

The financial feasibility analysis given is shown in table. Table 5, provides the information regarding projected IRR, NPV and payback period of the study based on combination of equity (50%) and debt (50%) financing for the proposed project.

Table 5: Financial Feasibility Debt Financing

Description	Project
IRR	30%
NPV (PKR)	1,189,634,950
Payback Period (years)	4.08
Projection Years	10
Discount Rate used for NPV	12%

9.2. Project Cost

Total investment cost of the project has been calculated to be PKR 713.7 million. The project will be financed through 100% equity. Table 6 provides the detail of cost of the proposed manufacturing unit.

Table 6: Project Cost

Description	Cost	Reference
Land	300,000,000	9.2.1
Building / Infrastructure	163,318,800	9.2.2
Plant & Machinery	218,112,000	9.2.3
Furniture & fixtures	835,000	0
Office vehicles	3,747,100	9.2.5
Office equipment	1,333,000	9.2.4
Pre-operating costs	9,034,180	9.2.6
Incorporation costs	500,000	9.2.7
Total Capital Costs	696,880,080	
Working Capital		
Equipment spare part inventory	908,800	
Raw material inventory	7,563,516	
Upfront insurance payment	3,346,622	
Cash	5,000,000	
Total Working Capital	16,818,938	
Total Project Cost	713,699,018	

9.2.1. Land

The Glass Manufacturing Unit will be started in own constructed building with an area of 90,000 square feet (20 Kanals). Constructing building for setting up a business makes it economically rational to start a business. Total cost of the land will be 300 million at 15 million per Kanal.

Breakup of the space requirement and construction cost details is provided in Table 7.

Table 7: Land Breakup

Break Up of Land Area	Area (Sq. Ft.)
Management building	1,500
Factory	85,500
Kitchen	144
Washrooms	448
Labor Living Area	1,200
Total Covered Area (A)	88,792
Pavement/driveway	900
Grounds	308
Total Uncovered Area (B)	1,208
Total Area (A+B)	90,000

Table 8: Factory Area

Factory	Length (ft.)	Width (ft.)	Total Area (sq. ft.)
Raw Material Area	145	100	14,500
Batching Plant	80	60	4800
Conveyors	30	20	600
Gas Plant	20	15	300
Mixer	10	10	100
Furnace/tower	300	90	27,000
Tin Bath	180	15	2,700
Annealing Lehr	100	15	1,500
Free Space	10	5	50
Inspection Area	20	10	200

Cutting Area	30	20	600
Stacking Area/ Finished Good Store	200	110	22,000
Canteen	30	20	600
Tubewell	15	10	150
Generator Room (750KW)	30	20	600
High Tension (HT) Room	50	30	1,500
Low Tension (LT) Room	50	30	1,500
Workshops			
General	60	50	3,000
Furnace	60	30	1,800
Machine	50	30	1,500
Store for spares	25	20	500
Total Area – Factory			85,500

9.2.2. Building

The Glass Manufacturing Unit will be established in own constructed building Industrial electricity connection of load of around 750 KW (B3) is required for proposed project. The cost of building construction will be 161.175 million. Table 9 provides details of building construction cost.

Table 9: Building Construction Cost

Break Up of Land Area	Construction Cost per Sq. Ft. (PKR)	Total Construction Cost (PKR.)
Management building	2,100	3,150,000
Factory	1,800	153,900,000
Kitchen	2,100	302,400
Washrooms	2,100	940,800
Labor Living Area	2,100	2,520,000
Pavement/driveway	300	270,000
Grounds	300	92,400
Total Area (A)		161,175,600
Interior Cost (B)		1,000,000
Boundary Wall (C) (Table 10)		2,083,200

Gate (C) (Table 11)		60,000
Total (A+B+C+D)		164,318,800

Table 10: Boundary Wall

Description	Length (Ft)	Running feet	Cost/Rft (PKR)	Cost (PKR)
Length (Rft)	600	1,200	1400	1,680,000
Width (Rft)	150	288	1400	403,200
Total				2,083,200

Table 11: Gate

Description	Length (Ft)	Height (Ft)	Total Area (Sq. ft.)	Cost/Sq ft (PKR)	Cost (PKR)
Gate (sq. ft.)	12	10	120	500	60,000

9.2.3. Machinery and Equipment

Table 12 provides details of machinery and equipment required for the project.

Table 12: Machinery and Equipment

Cost Item	Number of Items	Unit Cost (PKR)	Total Cost (PKR)
Gas Plant/Batching Plant	1	150,000,000	150,000,000
Mixer	1	5,000,000	5,000,000
Belt Conveyors	10	300,000	3,000,000
Lehr	1	5,000,000	5,000,000
Cutter	2	1,200,000	2,400,000
Weighing bridge (500KG)	5	250,000	1,250,000
Overhead Crane	3	1,000,000	3,000,000
Fork lifter (5 ton)	2	2,200,000	4,400,000
Tube well (100,000 Ltrs, 800 ft with 6" line)	1	1,500,000	1,500,000
Furnace oil tanks (100,000 Ltr)	1	1,000,000	1,000,000

Compressors (85 KW Screw type)	1	2,700,000	2,700,000
Chillers (500 Ltr)	2	400,000	800,000
Cooling tower	1	700,000	700,000
Backup generator (Diesel 750 KW)	1	5,500,000	5,500,000
Water Pump (20 HP)	2	45,000	90,000
High/ Low Tension Room	1	30,000,000	30,000,000
Lab Tools and Testing Kits			1,772,000
Total Cost (PKR)			218,112,000

Furniture & Fixtures

Table 13 provides details of the furniture and fixture requirement of the project.

Table 13: Furniture and Fixtures

Cost Item	Number of Items	Unit Cost (PKR)	Total Cost (PKR)
Office Tables	10	15,000	150,000
Executive Tables	2	35,000	70,000
Executive Chairs	2	20,000	40,000
Sofa Sets	2	35,000	70,000
Office Chairs	15	6,000	90,000
Guests Table	1	15,000	15,000
Racks/ Stands	10	10,000	100,000
Conference Room Furniture			300,000
Total			835,000

9.2.4. Office Equipment

Detail of office equipment required for the project is provided in Table 14.

Table 14: Office Equipment

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Air Conditioners	5	90,000	450,000
Water Dispenser / Water Cooler	2	20,000	40,000
Laptop Computers	4	80,000	320,000
Printer	3	40,000	120,000
Desktop Computers	6	30,000	180,000
Security Cameras (2MP)	16	2,000	32,000
DVR	2	12,000	24,000
LED	2	30,000	60,000
Ceiling Fan	15	5,000	75,000
Exhaust Fan	4	8,000	32,000
Total			1,333,000

9.2.5. Office Vehicle

Detail of office vehicle required for the project is provided in Table 15.

Table 15: Office Vehicle

Cost Item	Number of Vehicles	Unit Cost (PKR)	Total Cost (PKR)
Mini Truck	1	2,000,000	2,000,000
Carry Van	1	1,550,000	1,550,000
Motorcycles	2	80,000	160,000
Registration Charges		1%	37,100
Total			3,747,100

9.2.6. Pre-Operating Cost

Details of pre-operating cost for the project are provided in Table 16.

Table 16: Pre-Operating Cost

Description	Total (PKR)
Administration Cost	1,360,000
Electricity Connection Charges	2,838,000
Water Connection Charges (Table 17)	1,430,000
Telephone Connection Charges	5,000
Gas Connection Charges	20,000
Electricity Bill	814,986
Gas Bill	546,193
Electric wiring and Installations	1,000,000
Environmental Impact Assessment (EIA)	20,000
Interiors	1,000,000
Total	9,034,180

Electricity Connection charges include PKR 1,638,000 of 800KW transformer and PKR 1,200,000 installation charges.

Table 17: Boring (Tube Well) Charges

Particulars	Rate, Length
Boring Diameter (inch)	10
Boring Depth (feet) (A)	600
Boring Charges per Feet (B)	400
Particulars	Amount
Shifting Charges	15,000
Boring Charges (A*B)	240,000
Casing 6 inch @ 600 Rft	360,000
HDPE Pipe 90mm PN10 - 800ft @ 750 Rft	600,000
Gravel including Transportation	150,000
Submersible Water Pump 20HP	65,000
Total	1,430,000

9.2.7. Incorporation Cost

Table 18: Incorporation Cost

Description	Cost
Legal fees associated with setting up of company	500,000

9.3. Breakeven Analysis

Breakeven analysis is provided in Table 19.

Table 19: Breakeven Analysis

Particulars	Amount First Year (PKR)	Ratios
Sales	377,775,000	100%
Variable Cost	174,254,076	46%
Contribution	203,520,924	54%
Fixed Cost	90,144,935	24%
Breakeven		
Breakeven Units	3,346,536	
Breakeven Revenue	167,326,790	
Breakeven Capacity	21.22%	

9.4. Revenue Generation

Based on the 50% capacity utilization of the unit, sales revenue during the first year of operations is estimated in Table 20.

Table 20: Revenue Generation

Sale Price/ sq ft (A)	Production Sold (Sq. Ft.) (B)	Revenue PKR (A*B)
50	7,555,500	377,775,000

9.5. Variable Cost Estimate

Variable costs of the project have been provided in detail in Table 21.

Table 21: Variable Cost Estimate

Description	Cost
Material Cost	90,762,193
Machinery Maintenance	10,905,600
Direct Labor	51,060,000

Electricity Cost	9,612,680
Gas Cost	6,554,319
Water expense administration	166,800
Travelling expense	834,000
Communications expense (phone, mail, internet, etc.)	834,000
Office vehicles running expense	1,856,484
Office expenses (stationery, entertainment, janitorial services, etc.)	1,668,000
Total Indirect Variable Cost	174,254,076

Table 22 : Gas Consumption Cost

Particulars	Calculations	Amounts / Quantity
Production Sold (sq.ft)	A	7,555,500
MMBTU / sq. ft.of Float Glass	B	0.000823 0 ⁷
MMBTU	A*B=C	6,218.52
Variable Charges/MMBTU	D	1,054
Minimum Charges (per month 35,540 * number of months in year 12)	E	426,480
Variable Charges	F*G=H	6,554,319
Gas Cost	H+E=I	6,554,319

9.5.1.Raw Material Cost

Per unit cost of goods sold related to major components used in processing and total cost of goods sold based on estimated annual sales of 3,519,000 units is provided in Table 23.

Table 23: Raw material Cost Square Feet of Glass

Material	Material Composition in Glass	Cost/ ton of Material (PKR)	Consumption of Raw Material per Ton of Glass (PKR) (A)	Cost/ sq ft (PKR) (B= A/864))
Sand (Silica)	72.60%	3,500	2,541	2.94

⁷ <https://www.glass-ts.com/glass-weight-calculator>

Soda Ash	13%	45,000	5,850	6.77
Limestone (Calcium Oxide)	8.40%	2,000	168	0.19
Dolomite	4%	3,000	120	0.14
Alumina	1%	120,000	1,200	1.39
Colour/Refining Agents	1%	50,000	500	0.58
Total Cost (PKR)				12.01
Quantity Sold (sq. Ft.)				7,555,500
Raw Material Cost (PKR)⁸				90,741,555

Explanation: To calculate cost per square feet from consumption per ton an area of 864 square feet has been taken in one ton of 5mm annealed float glass sheet.⁹

9.6. Fixed Cost Estimate

Details of fixed cost for the project are provided in Table 24.

Table 24: Fixed Cost Estimate

Description	Amount per annum
Administration expense	16,680,000
Administration benefits expense	6,996,000
Utilities Indirect	167,157
Insurance expense	3,346,622
Promotional expense	7,555,500
Professional fees (legal, audit, consultants, etc.)	1,668,000
Depreciation expense	49,935,945
Amortization of pre-operating costs	1,806,836
Amortization of legal, licensing, and training costs	100,000
Bad debt expense	1,888,875
Total Fixed Cost	90,144,935

⁸ Difference due to rounding off.

⁹ Source: <https://www.glass-ts.com/glass-weight-calculator>

9.7. Human Resource Requirement

For the 1st year of operations, the human resource requirements are projected in Table 25.

Table 25: Human Resource Requirement

Designation	No.	Monthly Salary per person (PKR)	Total Monthly Salary (PKR)	Annual Salary (PKR)
CEO	1	500,000	500,000	6,000,000
Direct Labor				
Plant Manager	1	200,000	600,000	7,200,000
Shift Incharge	1	70,000	210,000	2,520,000
Furnace Staff-skilled	2	35,000	210,000	2,520,000
Furnace Staff-Unskilled	6	20,000	360,000	4,320,000
Tin Bath Staff -Skilled	2	35,000	210,000	2,520,000
Tin Bath Staff - Unskilled	6	35,000	630,000	7,560,000
Cooling Area Staff - Skilled	2	20,000	120,000	1,440,000
Cooling Area Staff - Unskilled	6	20,000	360,000	4,320,000
Cutting Machine Operators	3	35,000	315,000	3,780,000
Overhead Crane Operators	3	35,000	315,000	3,780,000
Forflit Operator	2	35,000	210,000	2,520,000
Mechanical Foreman	1	35,000	105,000	1,260,000
Electrical Foreman	1	35,000	105,000	1,260,000
Electrician	1	30,000	90,000	1,080,000
Welder/ Fitter	1	25,000	75,000	900,000
Quality Controller	1	40,000	120,000	1,440,000
Total Direct Labor	39			48,420,000
Indirect Labor				
Marketing/ Sales Incharge	1	40,000	40,000	480,000
Manager Accounts and finance	1	150,000	150,000	1,800,000

Assistant Manager accounts	2	70,000	140,000	1,680,000
Accounts Associate	5	40,000	200,000	2,400,000
Store Incharge	2	30,000	180,000	2,160,000
Store Assistant	3	25,000	225,000	2,700,000
Admin and HR Manager	1	80,000	80,000	960,000
Admin HR Associate	2	35,000	70,000	840,000
Office Boy	2	20,000	40,000	480,000
Security	6	20,000	120,000	1,440,000
Driver	2	25,000	50,000	600,000
Total Indirect Labor	27			15,540,000
Total	67			69,960,000

Direct labor works in 3 shifts of 8 hours each.

10. CONTACT DETAILS

Details of suppliers of Machinery and Equipment are provided in Table 26

Table 26: Suppliers of Machinery and Equipment

Machinery	Country	Contact Number	Email
Tank Furnace	China	39 030-963310	info@maestrihorni.it
Belt Conveyors	China	+86 373 579 9198	info@pkmachinery.com
Tools Machine	Singapore	929-242-6868	contact@info.com
Other glass manufacturing machines		+43 7477-405-5061	preowned@lisec.com

Contact details of suppliers of Machinery and Equipment are provided in Table 27.

Table 27: Contact Details of Suppliers/Manufacturers

Name	Type of Supply	Contact	Email Address	Web Address
ICI Pakistan	Raw Material Soda Ash.	+92 (051) 5495860-2	ccpa.pakistan@ici.com.pk	www.ici.com.pk
Eshal Industries	Raw Material - Lime Stone	92 309 6100031	info@eshalindustries.com	www.eshalindustries.com
Asia Commodities and Minerals	Raw Material Dolomite	+92 21 3564 0350-53	info@asiacm.net	www.asiacm.net
MIZ Builders	Raw Material Sand	+92-333-4138328	mizbuilders@gmail.com	www.mizbuilders.com
Humayun Chemicals	Raw Material Alumina	+92 321 846 7933	info @ humayunchemicals.com	www.humayunchemicals.com
Tariq Glass Industries	Finished Products	+92 (0) 42 111 34 34 34	info@tariqglass.com	www.tariqglass.com
Ghani Glass	Finished Products	+92-42-111-949-949		www.ghaniglass.com

11. USEFUL LINKS

Table 28: Useful Links

Organization	Link
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
Ministry of Industries and Production	www.moip.gov.pk
Trade Development Authority of Pakistan	www.tdap.gov.pk
Technical Education and Vocational Training Authority (TEVTA)	www.tevta.org
Punjab Vocational Training Council (PVTC)	www.pvtc.gop.pk
Punjab Small Industries Corporation (PSIC)	www.psic.gop.pk
Sindh Small Industries Corporation (SSIC)	www.ssic.gos.pk
Small Industries Development Board (SIDB)	www.sidbkb.com
Industries and Commerce Department Balochistan (ICDB)	www.dgicd.gob.pk
Government of Punjab	www.punjab.gov.pk
Government of Sindh	www.sindh.gov.pk
Government of Balochistan	www.balochistan.gov.pk
Government of Khyber Pakhtunkhwa	www.kp.gov.pk
Government of Gilgit Baltistan	www.gilgitbaltistan.gov.pk
Government of Azad Jammu & Kashmir	www.ajk.gov.pk
Pakistan Bureau of Statistics	www.pbs.gov.pk
UN Comtrade / International Trade Statistics Database	www.comtrade.un.org
Pakistan Mineral Development Corporation (PMDC)	www.punjmin.com
Ministry of Federal Education and Professional Training	www.mofept.gov.pk
Security and Exchange Commission of Pakistan	www.secp.gov.pk
State Bank of Pakistan	www.sbp.gov.pk

12. ANNEXURES

12.1. Income Statement

Income Statement										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	377,775,000	462,509,933	561,571,151	677,114,415	811,599,755	967,832,708	1,149,010,991	1,358,777,310	1,512,319,146	1,683,211,209
<i>Cost of sales</i>										
Material Cost	90,762,193	111,120,153	134,920,069	162,679,873	194,990,599	232,526,289	276,055,210	326,452,539	363,341,676	404,399,286
Direct Labor	51,060,000	54,787,380	58,786,859	63,078,299	67,683,015	72,623,875	77,925,418	83,613,974	89,717,794	96,267,193
Machinery Maintenance	10,905,600	12,137,933	13,509,519	15,036,095	16,735,174	18,626,248	20,731,014	23,073,619	25,680,938	28,582,884
Electricity Cost	9,612,680	11,450,409	13,537,137	15,902,457	18,579,241	21,603,992	25,017,221	28,863,876	31,403,897	34,167,440
Gas Cost	6,554,319	7,844,208	9,310,362	10,973,814	12,857,933	14,988,676	17,394,858	20,108,456	21,878,000	23,803,265
Total cost of sales	168,894,792	197,340,082	230,063,946	267,670,538	310,845,962	360,369,080	417,123,722	482,112,465	532,022,306	587,220,067
Gross Profit	208,880,208	265,169,850	331,507,205	409,443,877	500,753,793	607,463,627	731,887,269	876,664,845	980,296,840	1,095,991,142
<i>General administration & selling expenses</i>										
Administration expense	16,680,000	17,897,640	19,204,168	20,606,072	22,110,315	23,724,368	25,456,247	27,314,553	29,308,516	31,448,037
Administration benefits expense	6,996,000	7,506,708	8,054,698	8,642,691	9,273,607	9,950,580	10,676,973	11,456,392	12,292,708	13,190,076
Water expense administration	166,800	194,726	227,328	265,388	309,821	361,692	422,248	492,943	575,473	671,821
Utilities Indirect	167,157	199,114	235,401	276,532	323,079	375,678	435,031	501,922	546,091	594,147
Travelling expense	834,000	894,882	960,208	1,030,304	1,105,516	1,186,218	1,272,812	1,365,728	1,465,426	1,572,402
Communications expense (phone, fax, mail, internet, etc.)	834,000	894,882	960,208	1,030,304	1,105,516	1,186,218	1,272,812	1,365,728	1,465,426	1,572,402
Office vehicles running expense	1,856,484	1,992,007	2,137,424	2,293,456	2,460,878	2,640,522	2,833,280	3,040,110	3,262,038	3,500,167
Office expenses (stationery, entertainment, janitorial servi	1,668,000	1,789,764	1,920,417	2,060,607	2,211,032	2,372,437	2,545,625	2,731,455	2,930,852	3,144,804
Promotional expense	7,555,500	9,250,199	11,231,423	13,542,288	16,231,995	19,356,654	22,980,220	27,175,546	30,246,383	33,664,224
Insurance expense	3,346,622	2,844,629	2,342,635	1,840,642	1,338,649	836,656	334,662	5,759,756	4,895,793	4,031,829
Professional fees (legal, audit, consultants, etc.)	1,668,000	1,789,764	1,920,417	2,060,607	2,211,032	2,372,437	2,545,625	2,731,455	2,930,852	3,144,804
Depreciation expense	49,935,945	49,935,945	49,935,945	49,935,945	49,935,945	49,935,945	38,734,590	74,105,099	74,105,099	74,105,099
Amortization of pre-operating costs	1,806,836	1,806,836	1,806,836	1,806,836	1,806,836	-	-	-	-	-
Bad debt expense	1,888,875	2,312,550	2,807,856	3,385,572	4,057,999	4,839,164	5,745,055	6,793,887	7,561,596	8,416,056
Subtotal	95,504,219	99,409,646	103,844,964	108,877,244	114,582,219	119,138,569	115,255,180	164,834,573	171,586,251	179,055,868
Operating Income	113,375,989	165,760,204	227,662,241	300,566,634	386,171,574	488,325,058	616,632,089	711,830,272	808,710,589	916,935,274
Gain / (loss) on sale of machinery & equipment	-	-	-	-	-	-	54,528,000	-	-	-
Gain / (loss) on sale of office equipment	-	-	-	-	-	-	333,250	-	-	-
Gain / (loss) on sale of office vehicles	-	-	-	-	-	-	936,775	-	-	-
Earnings Before Interest & Taxes	113,375,989	165,760,204	227,662,241	300,566,634	386,171,574	488,325,058	672,430,114	711,830,272	808,710,589	916,935,274
Subtotal	-	-	-	-	-	-	-	-	-	-
Earnings Before Tax	113,375,989	165,760,204	227,662,241	300,566,634	386,171,574	488,325,058	672,430,114	711,830,272	808,710,589	916,935,274
Tax	38,801,595	57,136,071	78,801,784	104,318,321	134,280,050	170,033,770	234,470,539	248,260,594	282,168,705	320,047,345
NET PROFIT/(LOSS) AFTER TAX	74,574,394	108,624,134	148,860,458	196,248,313	251,891,524	318,291,289	437,959,575	463,569,677	526,541,884	596,887,929

12.2. Balance Sheet

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											
<i>Current assets</i>											
Cash & Bank	5,000,000	67,251,945	149,839,476	229,855,267	312,272,626	398,324,572	487,572,977	550,371,373	1,063,888,080	1,637,540,798	2,383,862,907
Accounts receivable		31,050,000	34,532,258	42,085,524	50,904,886	61,180,034	73,127,361	86,993,577	103,059,793	117,990,265	131,323,165
Finished goods inventory		7,343,251.81	8,580,003.58	10,002,780.24	11,637,849.46	13,515,041.82	15,668,220.89	18,135,813.98	20,961,411.50	23,131,404.60	25,531,307.27
Equipment spare part inventory	908,800	1,092,414	1,313,125	1,578,429	1,897,335	2,280,672	2,741,460	3,295,344	3,961,135	4,761,443	-
Raw material inventory	7,563,516	10,306,394	13,927,900	18,691,238	24,935,213	33,095,324	43,730,625	57,557,902	71,300,945	88,325,400	-
Pre-paid insurance	3,346,622	2,844,629	2,342,635	1,840,642	1,338,649	836,656	334,662	5,759,756	4,895,793	4,031,829	-
Total Current Assets	16,818,938	119,888,634	210,535,398	304,053,881	402,986,559	509,232,300	623,175,306	722,113,765	1,268,067,158	1,875,781,140	2,540,717,380
<i>Fixed assets</i>											
Land	300,000,000	300,000,000	300,000,000	300,000,000	300,000,000	300,000,000	300,000,000	300,000,000	300,000,000	300,000,000	300,000,000
Building/Infrastructure	163,318,800	146,986,920	130,655,040	114,323,160	97,991,280	81,659,400	65,327,520	48,995,640	32,663,760	16,331,880	-
Plant & Machinery	218,112,000	185,395,200	152,678,400	119,961,600	87,244,800	54,528,000	21,811,200	373,805,639	317,734,793	261,663,947	205,593,101
Furniture & fixtures	835,000	709,750	584,500	459,250	334,000	208,750	83,500	1,431,043	1,216,387	1,001,730	787,074
Office vehicles	3,747,100	3,185,035	2,622,970	2,060,905	1,498,840	936,775	374,710	7,633,586	6,488,549	5,343,511	4,198,473
Office equipment	1,333,000	1,133,050	933,100	733,150	533,200	333,250	133,300	2,284,528	1,941,849	1,599,169	1,256,490
Security against building	-	-	-	-	-	-	-	-	-	-	-
Total Fixed Assets	687,345,900	637,409,955	587,474,010	537,538,065	487,602,120	437,666,175	387,730,230	734,150,436	660,045,337	585,940,237	511,835,138
<i>Intangible assets</i>											
Pre-operation costs	9,034,180	7,227,344	5,420,508	3,613,672	1,806,836	-	-	-	-	-	-
Legal, licensing, & training costs	500,000	400,000	300,000	200,000	100,000	-	-	-	-	-	-
Total Intangible Assets	9,534,180	7,627,344	5,720,508	3,813,672	1,906,836	-	-	-	-	-	-
TOTAL ASSETS	713,699,018	764,925,932	803,729,916	845,405,617	892,495,515	946,898,475	1,010,905,536	1,456,264,202	1,928,112,495	2,461,721,378	3,052,552,518
Liabilities & Shareholders' Equity											
<i>Current liabilities</i>											
Accounts payable		13,939,718	17,075,233	20,798,538	25,218,310	30,464,602	36,693,447	44,092,537	52,371,153	59,438,152	53,381,363
Total Current Liabilities	-	13,939,718	17,075,233	20,798,538	25,218,310	30,464,602	36,693,447	44,092,537	52,371,153	59,438,152	53,381,363
Total Long Term Liabilities	-	-	-	-	-	-	-	-	-	-	-
<i>Shareholders' equity</i>											
Paid-up capital	713,699,018	713,699,018	713,699,018	713,699,018	713,699,018	713,699,018	713,699,018	713,699,018	713,699,018	713,699,018	713,699,018
Retained earnings		37,287,197	72,955,665	110,908,061	153,578,187	202,734,856	260,513,072	698,472,647	1,162,042,324	1,688,584,208	2,285,472,137
Total Equity	713,699,018	750,986,215	786,654,683	824,607,079	867,277,205	916,433,873	974,212,090	1,412,171,664	1,875,741,342	2,402,283,225	2,999,171,154
TOTAL CAPITAL AND LIABILITIES	713,699,018	764,925,932	803,729,916	845,405,617	892,495,515	946,898,475	1,010,905,536	1,456,264,202	1,928,112,495	2,461,721,378	3,052,552,518

12.3. Cash Flow Statement

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
<i>Operating activities</i>											
Net profit		74,574,394	108,624,134	148,860,458	196,248,313	251,891,524	318,291,289	437,959,575	463,569,677	526,541,884	596,887,929
Add: depreciation expense		49,935,945	49,935,945	49,935,945	49,935,945	49,935,945	49,935,945	38,734,590	74,105,099	74,105,099	74,105,099
amortization of pre-operating costs		1,806,836	1,806,836	1,806,836	1,806,836	1,806,836	-	-	-	-	-
amortization of training costs		100,000	100,000	100,000	100,000	100,000	-	-	-	-	-
Deferred income tax		-	-	-	-	-	-	-	-	-	-
Accounts receivable		(31,050,000)	(3,482,258)	(7,553,266)	(8,819,362)	(10,275,148)	(11,947,327)	(13,866,215)	(16,066,217)	(14,930,472)	(13,332,900)
Finished goods inventory		(7,343,252)	(1,236,752)	(1,422,777)	(1,635,069)	(1,877,192)	(2,153,179)	(2,467,593)	(2,825,598)	(2,169,993)	(2,399,903)
Equipment inventory	(908,800)	(183,614)	(220,711)	(265,304)	(318,906)	(383,338)	(460,787)	(553,884)	(665,791)	(800,308)	4,761,443
Raw material inventory	(7,563,516)	(2,742,878)	(3,621,506)	(4,763,338)	(6,243,975)	(8,160,111)	(10,635,301)	(13,827,277)	(13,743,043)	(17,024,455)	88,325,400
Advance insurance premium	(3,346,622)	501,993	501,993	501,993	501,993	501,993	501,993	(5,425,094)	863,963	863,963	4,031,829
Accounts payable		13,939,718	3,135,515	3,723,306	4,419,772	5,246,291	6,228,845	7,399,091	8,278,615	7,067,000	(6,056,789)
Other liabilities		-	-	-	-	-	-	-	-	-	-
Cash provided by operations	(11,818,938)	99,539,142	155,543,196	190,923,852	235,995,546	288,786,801	349,761,477	447,953,192	513,516,707	573,652,718	746,322,109
<i>Financing activities</i>											
Issuance of shares	713,699,018	-	-	-	-	-	-	-	-	-	-
Purchase of (treasury) shares		-	-	-	-	-	-	-	-	-	-
Cash provided by / (used for) financing activities	713,699,018	-	-	-	-	-	-	-	-	-	-
<i>Investing activities</i>											
Capital expenditure	(696,880,080)	-	-	-	-	-	-	(385,154,796)	-	-	-
Acquisitions		-	-	-	-	-	-	-	-	-	-
Cash (used for) / provided by investing activities	(696,880,080)	-	-	-	-	-	-	(385,154,796)	-	-	-
NET CASH	5,000,000	99,539,142	155,543,196	190,923,852	235,995,546	288,786,801	349,761,477	62,798,396	513,516,707	573,652,718	746,322,109

13. KEY ASSUMPTIONS

13.1. Operating Cost Assumptions

Table 29: Operating Cost Assumptions

Description	Details
Furniture and fixture depreciation	15%
Vehicle depreciation	15%
Office equipment depreciation	15%
Inflation rate	8.3%
Wage growth rate	7.3%
Electricity price growth rate	8.8%
Office equipment price growth rate	8.0%
Office vehicle price growth rate	10.7%

13.2. Revenue Assumptions

Table 30: Revenue Assumptions

Description	Details
Sale price growth rate	8.3%
Initial capacity utilization	50%
Capacity growth rate	5%
Maximum capacity utilization	85%

13.3. Financial Assumptions

Table 31: Financial Assumptions

Description	Details
Project life (Years)	10
Debt: Equity	0:100
Discount Rate used for NPV	15%

13.4. Debt Related Assumptions**Table 32: Debt Related Assumption**

Description of Cost	Details
Project Life (Years)	10
Debt: Equity	50:50
Discount Rate	12%
Debt Tenure	5 years
Grace Period	1 Year
Interest Rate (KIBOR+3%)	11.3%

13.5. Cash Flow Assumptions**Table 33: Cash Flow Assumptions**

Description	Details
Accounts receivable cycle (in days)	30
Accounts payable cycle (in days)	45

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
3 rd 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	5 TH 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