



Pre-feasibility Study

SETTING-UP SURVEYING INSTRUMENTS REPAIR UNIT

September 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

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

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For information	helpdesk.punjab@smeda.org.pk

2. EXECUTIVE SUMMARY

Surveying is defined as a method of determining the relative positions of different points on, above, or below the earth's surface by taking direct or indirect measurements of distance, direction and elevation. The planning and execution of most forms of construction require survey activity. It is also used in transport, communications, mapping, defining of legal boundaries for land ownership and is an important tool for research in many other scientific disciplines. The instruments used in these activities are known as surveying instruments. Common surveying instruments include Theodolites, Auto Level, Total Stations, RTK (Real Time Kinematics), GPS Receiver and Laser Level. These instruments are designed and manufactured to provide years of reliable use. Although, the shafts, spindles, pendulums and electronics of precision instruments are manufactured for rugged field conditions, these may still be damaged or lose their accuracy with their continuous use. Use of these instruments against the instructions given in the user manuals or careless handling of these instruments by the users may also lead to loss of functionality or accuracy of these instruments. In any such situation, there arises the need for repair and/or calibration of these instruments.

This "Pre-feasibility Document" provides details for "Setting up Surveying Instrument Repair Unit", (hereinafter referred to as instrument repair unit/proposed business). This scope of this study covers commonly used instruments; including Theodolite, Auto Level, Total Station, RTK (Real Time Kinematics) GPS Receiver and Laser Level. There is an overall lack of repair facilities for surveying instruments in Pakistan. The rapidly growing construction sector in Pakistan has led to an increasing demand for such repair facilities; which creates the basic rationale for this project. A repair unit may be established in large cities like Karachi, Lahore, Islamabad, Peshawar, Rawalpindi, Quetta, Faisalabad, Sialkot, Gujranwala, Hyderabad, Multan or any other city where construction activity is at a boom.

The proposed project has a total investment of PKR 4.65 million. This includes capital investment of PKR 4.02 million and working capital of PKR 0.63 million. The proposed facility will have a maximum capacity of performing 5,936 number of jobs of calibration and 2,800 number of jobs of repairing in a year. It is assumed that during the first year of operations, the business will achieve 50% capacity utilization and will perform 2,968 calibration jobs and 1,400 repair jobs. The capacity utilization is assumed to increase at the rate of 5% per annum to reach a maximum of 90% in year 9. This project is financed through 100% equity in which case the Net Present Value (NPV) is PKR 12.65 million with an Internal Rate of Return (IRR) of 64% and a Payback period of 2.34 years. Further, this project is expected to generate Gross Annual Revenues of PKR 11.08 million during 1st year of operation, Gross Profit (GP) ratio ranging from 59% to 78% and Net Profit (NP) ratio ranging from 3% to 34% during the projection period of 10 years. The proposed project will achieve its estimated breakeven capacity of 45% (3,958 jobs) with annual revenue of PKR 10.04 million.

The proposed project may also be established using leveraged financing. At 50% financing at a cost of KIBOR+3%, the proposed surveying instrument repair unit provides Net Present Value (NPV) of PKR 19.69 million, Internal Rate of Return (IRR) of 64% and Payback period of 2.34 years. Further, this project is expected to generate Net Profit (NP) ratio ranging from 1% to 34% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 48% (4,164 jobs) with annual revenue of PKR 10.55 million.

The proposed project will provide employment opportunities to 9 people including the owner. The legal business status of this project is proposed as "Sole Proprietorship".

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 provide information to the potential investors about “Setting-up Surveying Instrument Repair 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 attain 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.

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 & SERVICES

This document provides details for establishing a Surveying Instrument Repair Unit to provide services to the customers.

Surveying or land surveying is a technique of determining the terrestrial or three-dimensional positions of different points in space and the distances and angles between them. These points are usually located on the surface of the earth and they are often used to establish maps and boundaries for determining exact locations, establishing physical ownerships of land, determining the designed positions of structural components for construction or the surface location of subsurface features, or for other purposes as may be required by government’s different regulations and laws. A land surveying professional is called a land surveyor.

Surveying instruments are used to carry out such surveys. These are sophisticated instruments; designed to provide accurate results by using modern techniques. The instruments are built to sustain the impact of the hard environments in which they have to be used. These instruments are generally exposed to extreme conditions like high pressures, humid environments, dusty construction locations, etc. Moreover, they are also exposed to bumpy transportation in difficult areas where such survey is conducted. Ensuring proper care in the usage, storage and transportation of such instruments is therefore a major factor in successful completion of surveys. Inability to maintain the required good practices not only causes early replacement costs, but may also lead to having serious errors and inaccuracies in the results of the survey. In spite of taking all the required measures, the instruments still need maintenance. This maintenance may be for parts replacement, repairing any physical breakage/damage or calibrating the instruments to ensure their measurement accuracy. A surveying

instrument repair unit provides these services to maintain the instruments in good shape and working condition and to ensure their measurement accuracy so that the survey results are not faulty and are credible enough to present the actual picture on ground.

The proposed business will provide repair and calibration services for the following instruments:

- Auto Level
- Total Station
- Theodolite
- RTK (Real Time Kinematics) GPS receiver
- Laser Level

Repair Services

Repair service include replacement of faulty or damaged part of the surveying instruments; however, every time an instrument is repaired, calibration of that instrument is compulsory. Therefore, for every repair service, the charges will include repair and maintenance charges and the calibration charges.

Calibration Services

Calibration service include correcting the measuring capability of the surveying instrument of any deviations and inaccuracies and dimensional standards (or parts of a surveying instrument). Calibration determines any data that deviate from the 'normal'. There are usually two methods of calibration; performing calibration through instrument own system panel, or performing calibration through collimator.

Technical experts are the key resources for running this business. Civil engineering diploma holders are hired as calibration experts and repair experts with an average experience of 3-4 years. High return on investment and steady growth of business is expected with the experts having some prior experience in this field of business. The proposed business will be operated by two teams. The team providing calibration services includes 2 calibration experts and 1 helper while the team undertaking repair services will include 2 repair experts and 1 helper.

There is no requirement for obtaining affiliations/accreditations or registering the proposed business with any national or international body for providing the repair and calibration services; because the proposed business neither involves sale of equipment nor it acts as representative/agent of original manufacturers.

The success of the proposed business is associated with the skills and experience of hired employees i.e., how well-trained are the technicians to deal with any given circumstances.

5.1. Proposed Services

The instruments dealt by the proposed Surveying Instruments Repair Unit are explained below:

Auto Level

Auto level is a self-leveling optical instrument designed for surveyors, builders, engineers and other construction professionals. Auto level is used for developing drainage systems, grading, landscaping, setting foundations, subsidence¹ measuring and verifying elevations and angles in engineering, construction and land surveying work. Figure 1 shows auto level.

Figure 1: Auto Level



Theodolite

Theodolite is a basic surveying instrument used to measure the horizontal and vertical angles. In modern form, it consists of telescope mounted to swivel both horizontally and vertically. Theodolite is used for measuring angles, scaling points, highway points, huge buildings escalating edges of construction work. For land surveying work, theodolite is used for locating points on a line, finding differences in the level, prolonging survey lines, etc. Figure 2 shows a theodolite.

¹ Subsidence is sinking of the ground because of underground material movement. Subsidence is most often caused by the removal of water, oil, natural gas, or mineral resources out of the ground by pumping, fracking, or mining activities.

Figure 2: Theodolite**Total Stations**

A total station is an optical instrument commonly used in construction, surveying and civil engineering. It is useful for measuring horizontal angles, vertical angles and distances. It does this by analyzing the slope between itself and specific point through electronic distance meter Total stations are particularly useful for performing functions in engineering, construction and land surveying work like topographic surveys, land and title surveys, roadway and corridor surveys, infrastructure surveys, mine and quarry surveys, power line inspections, etc. Figure 3 shows a total station.

Figure 3: Total Station

Real Time Kinematic (RTK) GPS

Real Time Kinematic (RTK) is a technique used to improve the accuracy of standalone GNSS² receiver. Traditional GNSS receiver, like the one used in smart phone, could only determine the position with 2 to 4 meters accuracy but GNSS RTK receiver provides centimeter level accuracy. It measures distance by comparing a code generated by a satellite with the same code generated internally in the receiver and the time difference between the two codes multiplied by the speed of light give the distance. RTK is mainly used for applications that require higher accuracy such as cadastral serving,³ construction activities and drone's navigation,

Figure 4 shows RTK GPS receiver.

Figure 4: RTK GPS Receiver



Laser Level

The laser level is a control tool consisting of a rotating laser beam projector that can be affixed to a tripod. The tool is leveled according to the accuracy of the device and projects a fixed red or green beam in a plane about the horizontal and/or vertical axis. By using a laser level, grading, excavating, site preparation, concrete works, and other general construction projects accuracy can be determined without any difficulty. Figure 5 shows laser level.

² Global Navigation Satellite System (GNSS) is a general term describing any satellite constellation that provides positioning, navigation, and timing (PNT) services on a global or regional basis.

³ Cadastral surveying is the discipline of land surveying that relates to the definition or re-establishment of land parcel boundaries. Cadastral surveying involves interpreting and advising on boundary locations, status of land, and the rights, restrictions and interests in property.

Figure 5: Laser Level

5.2. Tools and Equipment's Used for Repair and Testing

Tools and equipment's used for repair and testing are explained below:

General Tool Kit and Other Equipment

General tool kit include fitting tools, such as wrenches, spanners, screwdrivers, pliers which are helpful in repair of surveying instruments. Other equipment used in the proposed business are explained below:

Ammeter

Ammeter is used for measuring either direct or alternating electric current in surveying instrument.

Soldering Iron Hand Tool

Soldering iron hand tool is used to repair the damaged circuit boards and rejoin the wires of survey instruments.

Laser Distance Meter

Laser distance meter is the ideal device to ascertain the measurements of distance without bulky reel-in tapes, or walking wheel distance measurement systems. The laser distance meter is used for accurately determining the distance of an object or span without contact by way of a laser. The basic measuring principle is based on measuring the transit time of laser pulses between the laser distance meter and the object to be measured. Considering the speed of light, distances can be determined precisely with a laser distance meter. Additionally, the laser distance meter can accumulate independently to calculate surfaces and volumes. The laser distance meter is the ideal device for a civil engineer, and any other large-scale operations in which distance measurement accuracy is paramount. The laser distance meter is

frequently used in the industrial sector and especially with professions relating to construction. Laser distance meter is an instrument for testing distance in situations where no other measurement instrument can possibly do. The laser distance meter can procure the distance from or to a target location silently and invisibly. In our proposed project, laser distance meter is used in field testing of surveying instruments as a helping tool; either before or after the repair and calibration of instrument to determine the distance, volume, area, etc. Figure 6 shows Laser distance meter.

Figure 6: Laser Distance Meter



Digital Collimator

This instrument is dedicated to test and adjust the horizontal accuracy and plummet accuracy of the laser levels and laser plummet. The instrument can be used for professional testing and calibration of the accuracy of the laser level, auto level, theodolite and total station with laser pointing. The instrument has two collimator tubes with industrial CCD (Charge-Coupled Device) camera, one is horizontal and another one is vertical. Through the CCD digital eyepiece system, the reticle⁴ and the laser line will be displayed on the screen at the same time. These are equipped with dedicated industrial lens and laser filter. These features make it a complete and perfect inspection system for the laser levels, auto level, theodolite and total station. Figure 7 shows digital collimator.

⁴ Pattern of fine lines or markings built into the eyepiece of an optical device to provide measurement references during visual inspections

Figure 7: Digital Collimator**Tripod**

A surveyor's tripod is a device used to support any a surveying instrument such as theodolite, total station and levels. Figure 8 shows tripod.

Figure 8: Tripod**Bipod**

A Bipod is a portable two-legged frame, used as a platform for supporting the weight and maintaining the stability of some other object. In laser scanning, mapping, and other surveying applications, bipods are used to support and keep instruments stable; especially on uneven ground. These instruments include GPS antennas, prism poles, ranging rods, etc. Figure 9 shows a bipod.

Figure 9: Bipod**Leveling Staff**

Leveling staff is an instrument used to determine the difference in height between two points. Levelling staff is known as the staff rod, leveling rod, and self-reading staff, as the staff readings may be taken directly by the instrument man from the leveling instrument. Leveling staff used in the calibration testing of auto level by placing leveling staff in front of the auto level and taking different readings to test the accuracy of auto level. Figure 10 shows levelling staff.

Figure 10: Levelling Staff

Prism & Prism Pole

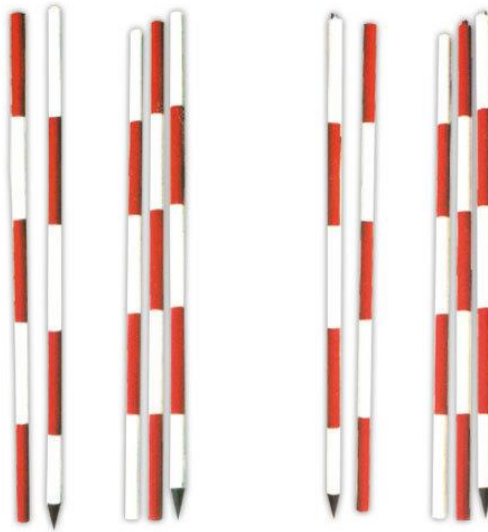
Optical survey prisms represent specially designed retro reflectors. Corner reflector is a common type that is used to reflect the Electronic Distance Measurement (EDM) beam from a total station. Optical survey prism is used while testing the calibration of total station the total station sends out invisible infrared waves that are reflected by the prism, which is typically attached to a prism pole. By measuring the prism's position and knowing the precise angle and distance to that prism, the total station calculates the prism's location or coordinates. Figure 11 shows prism and prism pole.

Figure 11: Prism & Prism Pole



Ranging Rod

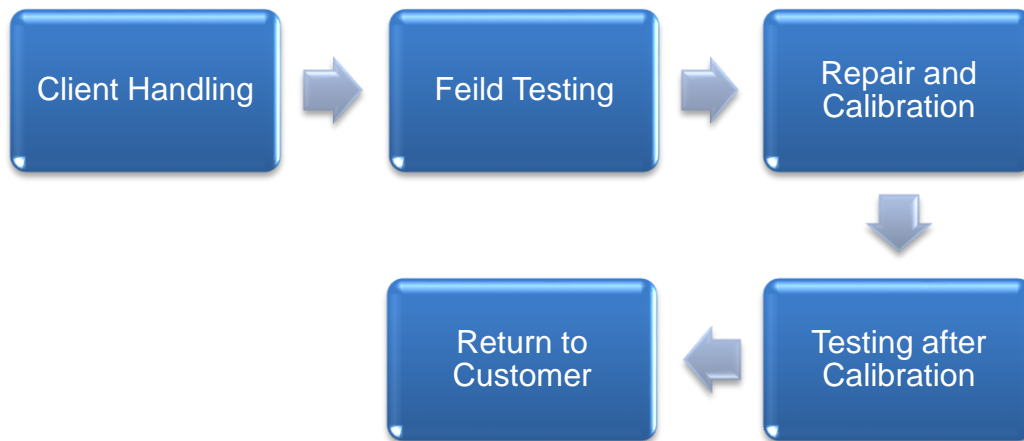
Ranging rod is a surveying instrument used for marking the position of stations and for sightings of those stations as well as for ranging straight lines. Surveying is to mark reference points of surveying instruments, and these points are a guide through the whole construction. When a survey is supposed to be conducted on any construction site, its length is greater than the chain. It becomes essential that the measurements are aligned with the chain. This method of marking intermediate points of surveying instruments on the survey line is defined as ranging which will be done with the help of ranging rod. Figure 12 shows ranging rod.

Figure 12: Ranging Rod**Surveyor Compass**

The surveyor compass is an instrument for determining the horizontal direction of a line with reference to the direction of a magnetic needle. If the surveying area is large, chain surveying is not adopted for surveying; rather compass surveying is employed. Also, If the plot for surveying has numerous obstacles and it fluctuates which prevents chaining, then compass surveying is employed. The circle is covered with a glass plate to protect the needle and the graduations, the part enclosed being known as the “compass-boss”. Figure 13 shows surveyor compass.

Figure 13: Surveyor Compass**5.3. Process Flow of Surveying Instrument Repair Unit**

The process flow for surveying repair unit is shown in Figure 14.

Figure 14: Process Flow of Surveying Instrument Repair Unit

Brief description of the process flow is as follows:

Client Handling

The customers coming to get the service may be corporate customers or walk-in customers. For corporate customer, proper appointment is given to him to bring the instrument to the shop. However, walk-in customer can come at any time to the shop with the instrument for its repair and maintenance.

Field Testing

In field testing, an instrument is tested in a physical field environment. Two types of testing is performed during field testing. These include short sight measurement testing and long sight measurement testing. For short sight measurement testing, artificial environment is created around shop surroundings. In this testing, the experts set standards, levels and parameters to check and test the instrument. For long sight measurement testing, the experts normally go to open environments like roads, under-construction sites, parks, etc. During long sight measurement testing, experts undertake critical assessment of the surveying instrument and analyze the performance of the whole instrument to determine whether the issue is related to repair services or calibration services.

Repair and Calibration

As a result of field testing, experts identify the root cause of issue and also establish whether the equipment need repair or requires calibration. In case only calibration service is to be provided, it may be done by two methods. First method includes calibrating the instrument through the instrument's own systematic panel. In this method experts take different readings of the instrument and check for any difference in readings and errors. When there is no difference or error or the identified difference is within an acceptable level, the instrument is considered to be fully calibrated. However, if case there is any error or large differences identified, the experts use the instrument panel setting and adjust the accuracy, differences and errors. The second

method of calibration involves adjusting the instrument on collimator, using which the expert can completely check the accuracy and calibration of instrument.

Repair services include replacement of faulty or damaged part of the instrument; which are not in a condition to be repaired. Therefore, these parts are replaced with new parts. Once an instrument is repaired, calibration is compulsory to make sure that instrument provides accurate readings. Whenever repair services are provided, the total charges include repair as well as calibration charges.

Testing after Calibration

After repair and calibration of the instrument, the expert tests the instrument again in physical environment (the testing is similar to the methods mentioned in the Field Testing heading) to check the calibration and accuracy of the instrument.

Return to Customer

After ensuring that the instrument is satisfactorily repaired and calibrated, is fully functional and is providing accurate measurements, the instrument is returned to the customer.

5.4. Concept of Quality in a Surveying Instrument Repair Unit

Quality of a surveying instrument repair unit is generally measured in terms of the following two parameters.

Technical Quality: This is associated with the technical aspects of a facility as reflected by service providers' qualification, skills, experience, processes outcomes which show how well are the technicians to deal with any kind of given circumstances. Usage of modern machinery and latest instrument is a significant part of technical aspects of services.

Service Quality: The repair facility needs to ensure consistent provision of quality services. The quality of services includes the following aspects:

- The customers should be able to easily access the technician, whenever they need any advice.
- Availability of latest software improve the efficiency of staff and streamline business operations and accounts and also increase or measure office productivity
- The behavior of support staff and administration staff is monitored to ensure that they remain helpful and friendly with the customer.

5.5. Installed and Operational Capacities

The proposed facility will have a maximum capacity of performing 5,936 number of jobs of calibration and 2,800 number of jobs of repairing in a year. It is assumed that during the first year of operations, the unit will utilize 50% of its total service capacity and will perform 2,968 number of jobs of calibration and 1,400 number of jobs of repairing. The

capacity utilization is assumed to increase at the rate of 5% per annum to reach a maximum of 90% in year 9. Table 1 shows details of maximum annual capacity and operational capacity utilized for calibration during the first year of operations. Table 2 shows details of maximum annual capacity and operational capacity utilized for repair during the first year of operations

Table 1: Service Capacity-Calibration

Services	No. of Teams	Average Time Required for Calibration (Hours)	Total Working Hours	Service Ratio (%)	Annual Capacity (No of Jobs)	Initial year Capacity @ 50%
Auto Level	1	0.2	2,240	20%	2,688	1,344
RTK GPS		1.0		15%	336	168
Total Station		0.5		35%	1,568	784
Theodolite		0.3		15%	1,008	504
Laser level		1.0		15%	336	168
Total				100%	5,936	2,968

Table 2: Service Capacity-Repair

Services	No. of Team	Average Time Required for Repair (Hours)	Total Working Hours	Service Ratio (%)	Annual Capacity (No of Jobs)	Initial year Capacity @ 50%
Auto Level	1	0.5	2,240	25%	1,120	560
RTK GPS		2.0		10%	112	56
Total Station		1.0		30%	672	336
Theodolite		0.8		25%	747	373
Laser level		1.5		10%	149	75
Total				100%	2,800	1,400

6. CRITICAL FACTORS

Before making the decision to invest in Surveying Instrument Repair Unit business, one should carefully analyze the associated risk factors. The important considerations in this regard include:

- Employment of trained and professional technical staff
- Usage of modern, reliable instruments
- Availability of latest Technology
- Regular feedback and follow ups of the customers
- Uninterrupted supply of electricity

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

Growing construction sector has led to an increasing demand for survey instruments repair facility. Such a repair facility may be established in cities such as Karachi, Lahore, Islamabad, Peshawar, Rawalpindi, Quetta, Faisalabad, Sialkot, Hyderabad, Gujranwala, Multan or any other major city in the country. The reason of selecting these cities is due to rapid growth in construction sector in these cities. Some major construction projects going on in the country include CPEC related infrastructure projects, construction of M-9 Motorway Karachi-Hyderabad, construction of Crescent Bay in Karachi, LDA (Lahore Development Authority) City project, G.T. (Grant Trunk) Road Expressway, Ravi Riverfront Urban Development Project.

8. POTENTIAL TARGET MARKETS

The demand for the proposed business will arise from the construction sector, mining sector and universities and colleges where civil students need these kinds of instruments for their educational courses. There is a direct relationship between construction and development activity and the need for repair and calibration services for surveying equipment. This means that there will be more demand for calibration and repair services during increase in construction activities.

9. PROJECT COST SUMMARY

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

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

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

9.1. Initial Project Cost

Table 3 provides fixed and working capital requirements for establishment and operations of the Surveying Instrument Repair Unit business.

Table 3: Project Cost

Description of Costs	Amount (PKR)	Reference
Land	-	9.1.1
Building Renovation Costs	76,390	9.1.2
Repair Tools	696,000	9.1.3
Furniture & Fixtures	590,000	9.1.4
Office Equipment	759,000	9.1.5
Office Vehicles	1,192,500	9.1.6
Pre-operating Costs	334,989	9.1.7
Advance Rent / Security	375,000	9.1.8
Total Capital Cost	4,023,879	
Upfront Building Rent	125,000	
Cash	500,000	
Working Capital	625,000	9.1.9
Total Project Cost	4,648,879	

9.1.1. Land

The surveying instrument repair unit will be established in a rented building to avoid the high cost of land. Suitable location for setting up a business like this can be easily found on rent. Therefore, no land cost has been added to the project cost. Total space requirement for the proposed unit has been estimated as 675 sq. feet (3 Marla). The breakup of the space requirement is provided in Table 4.

Table 4: Breakup of Space Requirement

Breakup of Land Area	% Break-Up	Area Sq. Ft.
Executive Office	17%	115
Staff Workstations	36%	240
Admin Area	16%	110
Kitchen	9%	60
Conference Room	15%	100
Washrooms	7%	50
Total Area	100%	675

9.1.2. Building and Renovation Cost

There will be no cost of building construction since the unit will be started in rented premises. However, there will be a renovation cost required to make the building usable for the business. The proposed project requires electricity load of around 3 KW for which an electricity connection under the General Supply Tariff-Commercial single phase will be required. Building rent of PKR 125,000 per month has been included in the operating cost. Building renovation cost is shown in Table 5.

Table 5: Building Renovation Cost

Cost Item	UOM	Total Units	Cost/Unit (PKR)	Total Cost (PKR)
Paint Cost	Liter	28	500	14,130
Labour Cost	Sq. Feet	2,826	10	28,260
Curtains	Units	2	8,000	16,000
Blinds	Units	6	3,000	18000
Total (PKR)				76,390

9.1.3. Repair Tools Requirement

Table 6 provides details of repair tools required for establishing Survey Instrument Repair Unit.

Table 6: Repair Tools Requirement

Cost Item	Number of Items	Unit Cost (PKR)	Cost (PKR)
General Tool Kit	2	10,000	20,000
Ammeter	2	5,000	10,000
Soldering Iron	2	2,000	4,000
Digital Collimator	1	450,000	450,000
Laser Distance Meter	2	13,000	26,000
Tripod	2	12,000	24,000
Bipod	2	2,000	4,000
Prism	2	28,000	56,000
Prism Pole	2	9,000	18,000
Levelling Staff	2	5,000	10,000
Surveyor Compass	2	5,000	10,000
Ranging Rod	2	32,000	64,000

Total			696,000
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9.1.4. Furniture & Fixture Requirement

Table 7 provides details of the furniture and fixture requirement of the project.

Table 7: Furniture and Fixtures Requirement

Cost Item	Number of Items	Unit Cost (PKR)	Total Cost (PKR)
Executive Chairs	1	20,000	20,000
Executive Table	1	30,000	30,000
Staff Tables	6	25,000	150,000
Staff Chairs	10	10,000	100,000
Visitors' Chairs	6	10,000	60,000
Sofa Set	1	35,000	35,000
Cabinets	3	10,000	30,000
Table for Conference Room	1	25,000	25,000
Chairs for Conference Room	10	10,000	100,000
Adjustable Steel Racks	4	10,000	40,000
Total			590,000

9.1.5. Office Equipment Requirement

Details of office equipment required for the project is provided in Table 8.

Table 8: Office Equipment Requirement

Cost Item	Number of Items	Unit Cost (PKR)	Cost (PKR)
Air Conditioners	4	90,000	360,000
Laptop	3	80,000	240,000
Printer	1	40,000	40,000
Water Dispenser	1	20,000	20,000
Security System	4	2,000	8,000
DVR	1	12,000	12,000
LED/LCD	1	40,000	40,000
WI-FI/ Internet Connection	2	5,000	10,000
Ceiling Fan	5	5,000	25,000
Exhaust Fan	2	2,000	4,000

Total			759,000
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9.1.6. Office Vehicle Requirement

Details of office vehicle required for the project is provided in Table 9.

Table 9: Office Vehicle Requirement

Cost Item	Unit	Unit Cost (PKR)	Registration fee (PKR)	Total Cost (PKR)
Motorcycle	1	80,000	1,500	81,500
Carry Van	1	1,100,000	11,000	1,111,000
Total Cost				1,192,500

9.1.7. Pre-Operating Costs

Details of pre-operating cost for the project are provided in Table 10.

Table 10: Pre-Operating Cost

Cost Item	Number / Months	Total Cost (PKR)
Administration expenses	1	320,000
Utilities expenses	1	14,989
Total (PKR)		334,989

9.1.8. Security against Building

Details of security against building rent for the project are provided in Table 11.

Table 11: Security against Building Rent

Cost Item	Months	Unit Cost/Month (PKR)	Total Cost (PKR)
Security against building rent	3	125,000	375,000
Total			375,000

9.1.9. License & Permits, etc.

Any affiliation is not needed from any official body as in this project the instruments are not for selling/rental purpose, they are here just for calibration and repair services purpose and also in Pakistan there is no such body which monitors the dealing of surveying instrument.

9.1.10. Initial Working Capital

Table 12 provides details of working capital requirements for the project.

Table 12: Working Capital Requirements

Cost Item	No. of Months	Unit Cost (PKR)	Amount (PKR)
Upfront building rent	1	125,000	125,000
Cash		500,000	500,000
Total			625,000

9.2. Breakeven Analysis

Breakeven analysis is provided in Table 13.

Table 13: Breakeven Analysis

Particulars	Amount First Year (PKR)	Ratios
Sales	11,078,667	100%
Variable Cost	5,519,503	50%
Contribution	5,559,163	50%
Fixed Cost	5,037,494	45%
Breakeven		
Breakeven (No. of Jobs)		3,958
Breakeven Revenue (PKR)		10,039,050
Breakeven Capacity		45%

9.3. Revenue Generation

The total revenue generated from this project is PKR 11,078,667 for the 1st year. Table 14 provides details for revenue generation of the Surveying Instrument Repair Unit for calibration jobs during the first year of operations, based on 50% capacity utilization.

Table 15 provides details for revenue generation of the Surveying Instrument Repair Unit for repair jobs during the first year of operations, based on 50% capacity utilization.

Table 14: Revenue Generation-Calibration

Services	Annual Capacity (No of Jobs)	Initial year Capacity @ 50%	Service Charges per job (PKR)	Revenue per Year (PKR)
Auto Level	2,688	1,344	1,500	2,016,000
RTK GPS	336	168	15,000	2,520,000

Total Station	1,568	784	3,000	2,352,000
Theodolite	1,008	504	2,000	1,008,000
Laser Level	336	168	4,500	756,000
Total	5,936	2,968		8,652,000

Table 15: Revenue Generation-Repair

Services	Annual Capacity (No of Jobs)	Initial year Capacity @ 50%	Service Charges per system (PKR)	Revenue per Year (PKR)
Auto Level	1,120	560	1,000	560,000
RTK GPS	112	56	8,000	448,000
Total Station	672	336	2,000	672,000
Theodolite	747	373	1,500	560,000
Laser Level	149	75	2,500	186,667
Total	2,800	1,400		2,426,667

9.4. Variable Cost Estimate

Variable costs of the project have been provided in detail in Table 16.

Table 16: Variable Cost Estimate

Description of Costs	Total Cost (PKR)
Direct Labor	4,560,000
Utilities Direct	6,703
Travelling expenses	96,000
Communications expense (phone, mail, internet, etc.)	192,000
Office vehicles running expense	528,000
Office expenses (stationery, entertainment, janitorial services, etc.)	136,800
Total Variable Cost (PKR)	5,519,503

Table 17: Direct Labor

Post	No of personnel	Monthly Salary (PKR)	Annual Salary (PKR)
Calibration Expert	2	90,000	2,160,000
Repair Expert	2	70,000	1,680,000
Helper	2	30,000	720,000
Total Direct Labor (PKR)	6		4,560,000

Table 18: Vehicle Maintenance Cost

Particulars	Motorcycle (PKR)	Carry Van (PKR)	Total Cost (PKR)
Fuel cost	9,000	30,000	39,000
Service Charges	500	2,000	2,500
Oil & Tuning	1,000	1,500	2,500
Monthly expenses/ Motorcycle	10,500	33,500	44,000
No of Vehicles	1	1	2
Monthly vehicle running cost	10,500	33,500	44,000
Yearly Cost	126,000	402,000	528,000

Table 19: Variable cost Assumptions

Description of Costs	Rate	Rationale
Travelling expense	5%	of administration expense
Communications expense (phone, mail, internet, etc.)	10%	of administration expense
Office expenses (stationery, entertainment, janitorial services, etc.)	3%	of staff salaries

9.5. Fixed Cost Estimate

Details of fixed cost for the project are provided in Table 20.

Table 20: Fixed Cost Estimate

Description of Costs	Amount (PKR)
Management Staff	1,920,000
Administration benefits expense	648,000

Building rental expense	1,500,000
Utilities	173,166
Promotional expense	110,787
Depreciation expense	618,544
Amortization of pre-operating costs	66,998
Total Fixed Cost	5,037,494

Table 21: Staff Salaries

Post	No.of Employees	Monthly Salary (PKR)	Annual Salary (PKR)
Engineer	1	100,000	1,200,000
Accountant	1	40,000	480,000
Office Boy	1	20,000	240,000
Total	3		1,920,000

Table 22: Fixed Cost Assumptions

Description of Costs	Rate	Rationale
Administration benefits expense	10%	of Admin Expense
Promotional expense	1%	of revenue
Depreciation		
Building renovation costs	10%	of cost
Office Equipment/Furniture and Fixture	15%	of cost
Repair Tools	33%	of cost

9.6. 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 23.

Table 23: Financial Feasibility Analysis

Description	Project
IRR	64%
NPV (PKR)	12,650,383
Payback Period (years)	2.34

Projection Years	10
Discount Rate used for NPV	25%

9.7. 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 24.

Table 24: Financial Feasibility Debt Financing

Description	Project
IRR	64%
NPV (PKR)	19,685,633
Payback Period (years)	2.34
Projection Years	10
Discount Rate used for NPV	18%

9.8. Human Resource Requirement

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

Table 25: Human Resource Requirement

Post	No.of Employees	Monthly Salary (PKR)	Annual Salary (PKR)
Engineer	1	100,000	1,200,000
Calibration Expert	2	90,000	2,160,000
Repair Expert	2	70,000	1,680,000
Helper	2	30,000	720,000
Accountant	1	40,000	480,000
Office Boy	1	20,000	240,000
Total	9		6,480,000

10. CONTACT DETAILS

Details of service providers are provided in Table 26.

Table 26: Contact Details

Name of Service Provider	Address	Contacts
Sundar Trading Company	Lodhi Arcade, Ferozepur Rd, Jubilee Town, Lahore, Punjab 54000	0300 9427482
Nasko	206/207, shaheen Centre, 2nd Floor, dc-5, scheme No.5, block-7, clifton Karachi	(92 21) 35379041
Instruments Traders	Plot No. 1044 First Floor Sector 31 G Abdul Khaliq Allah Wal Town, Allah Wala Town Sector H Korangi, Karachi, Karachi City, Sindh 75400	0300 8213260
Public Surveying System	160, New Anarkali , Lahore , Pakistan	0300-8486282
Maqbool Surveying Store (Ihsan)	Peshawar Ring Rd, Gulbahar, Peshawar, Khyber Pakhtunkhwa	0300 5876537
Surveyor engineer	Yaqoob khan plaza 1st floor mandian, Abbottabad, 22010	0301 8702244
Shahzad Brother Auto Level-Civil Laboratory	Shamsabad, Murree Rd, Shamsabad, Rawalpindi, Punjab 46000	0300 5223848
Sarhad Surveying & Engineering company	Hamdarad street, near imam bargah, Peshawar	0336 5554428
KBS Enterprise	H1566 Street # 54 Phase III Bahira Town Islamabad	(+92-51)-5733470

11. USEFUL LINKS

Table 27: Useful Links

Name of the Organization	Email/Website
Small and Medium Enterprises Development Authority (SMEDA)	www.smeda.org.pk
National Business Development Program	www.nbdp.org.pk
China–Pakistan Economic Corridor (CPEC)	www.cpec.gov.pk
Frontier Works Organization (FWO)	www.fwo.com.pk
National Highway Authority (NHA)	www.nha.gov.pk
Pakistan Mineral Development Corporation (PMDC)	www.sindhhealth.gov.pk
Ravi Riverfront Urban Development Project	www.ruda.gov.pk
Pakistan Bureau of Statistics	www.pbs.gov.pk
Naya Pakistan Housing & Development Authority	www.naphda.gov.pk
Ministry Of Housing And Works Government of Pakistan	www.mohw.gov.pk
Housing Department Government of Khyber Pakhtunkhwa	www.housing.kp.gov.pk
Communication Works, Physical Planning And Housing Government of Balochistan	www.balochistan.gov.pk/departments/communication-works-physical-planning-and-housing
Housing, Urban Development and Public Health Engineering Government of Punjab	www.punjab.gov.pk/hud_phe
Human Settlement, Spatial development & Social Housing Department Government of Sindh	www.skaa.sindh.gov.pk

12. ANNEXURES

12.1. Income Statement

Calculations										SMEDA
Income Statement										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue -Calibration	8,652,000	10,476,696	12,588,960	14,985,657	17,775,474	20,964,613	24,615,698	28,802,139	33,525,996	36,900,946
Revenue -Repair	2,426,667	2,938,046	3,527,792	4,206,500	4,986,105	5,880,042	6,903,431	8,073,275	9,408,690	10,355,831
Revenue from services	11,078,667	13,414,742	16,116,753	19,192,157	22,761,579	26,844,655	31,519,129	36,875,414	42,934,686	47,256,777
<i>Cost of sales</i>										
Staff salaries	4,560,000	5,002,320	5,487,545	6,019,837	6,603,761	7,244,326	7,947,026	8,717,887	9,563,522	10,491,184
Utilities Direct	6,703	7,309	7,969	8,690	9,475	10,331	11,265	12,283	13,393	14,603
Total cost of sales	4,566,703	5,009,629	5,495,514	6,028,527	6,613,236	7,254,657	7,958,290	8,730,170	9,576,915	10,505,786
Gross Profit	6,511,963	8,405,113	10,621,238	13,163,631	16,148,343	19,589,998	23,560,839	28,145,245	33,357,771	36,750,991
<i>General administration & selling expenses</i>										
Management Staff	1,920,000	2,106,240	2,310,545	2,534,668	2,780,531	3,050,242	3,346,116	3,670,689	4,026,746	4,417,340
Administration benefits expense	648,000	710,856	779,809	855,451	938,429	1,029,457	1,129,314	1,238,858	1,359,027	1,490,852
Building rental expense	1,500,000	1,650,000	1,815,000	1,996,500	2,196,150	2,415,765	2,657,342	2,923,076	3,215,383	3,536,922
Utilities	173,166	188,814	205,877	224,481	244,767	266,886	291,003	317,300	345,974	377,238
Travelling expense	96,000	105,312	115,527	126,733	139,027	152,512	167,306	183,534	201,337	220,867
Communications expense (phone, mail, internet, etc.)	192,000	210,624	231,055	253,467	278,053	305,024	334,612	367,069	402,675	441,734
Office vehicles running expense	528,000	581,152	639,655	704,047	774,921	852,929	938,791	1,033,296	1,137,314	1,251,804
Office expenses (stationery, entertainment, etc.)	136,800	150,070	164,626	180,595	198,113	217,330	238,411	261,537	286,906	314,736
Promotional expense	110,787	134,147	161,168	191,922	227,616	268,447	315,191	368,754	429,347	472,568
Depreciation expense	618,544	618,544	618,544	697,929	690,969	690,969	668,313	1,028,196	1,028,196	1,165,541
Amortization of pre-operating costs	66,998	66,998	66,998	66,998	66,998	-	-	-	-	-
Subtotal	5,990,294	6,522,757	7,108,803	7,832,791	8,535,573	9,249,561	10,086,398	11,392,309	12,432,905	13,689,602
Operating Income	521,669	1,882,356	3,512,435	5,330,840	7,612,770	10,340,436	13,474,441	16,752,935	20,924,866	23,061,389
Other income (interest on cash)	-	-	-	-	-	-	-	-	-	-
Other income 2	-	-	-	-	-	-	-	-	-	-
Gain / (loss) on sale of machinery & equipment	-	-	-	-	-	-	-	-	-	-
Gain / (loss) on sale of office equipment	-	-	-	-	-	-	189,750	-	-	-
Gain / (loss) on sale of office vehicles	-	-	-	-	-	-	298,125	-	-	-
Earnings Before Interest & Taxes	521,669	1,882,356	3,512,435	5,330,840	7,612,770	10,340,436	13,962,316	16,752,935	20,924,866	23,061,389
Subtotal	-	-	-	-	-	-	-	-	-	-
Earnings Before Tax	521,669	1,882,356	3,512,435	5,330,840	7,612,770	10,340,436	13,962,316	16,752,935	20,924,866	23,061,389
Tax	138,483	172,353	498,108	1,019,252	1,784,469	2,739,152	4,006,810	4,983,527	6,443,702	7,191,485
NET PROFIT/(LOSS) AFTER TAX	383,186	1,710,002	3,014,326	4,311,588	5,828,301	7,601,284	9,955,506	11,769,409	14,481,164	15,869,904

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											
<i>Current assets</i>											
Cash & Bank	500,000	1,711,019	3,711,952	5,580,336	9,064,501	13,214,260	16,836,213	18,545,035	25,184,381	31,291,358	39,226,925
Accounts receivable	-	-	-	-	-	-	-	-	-	-	-
Pre-paid building rent	125,000	137,500	151,250	166,375	183,013	201,314	221,445	243,590	267,949	294,743	-
Total Current Assets	625,000	1,848,519	3,863,202	5,746,711	9,247,513	13,415,574	17,057,658	18,788,625	25,452,330	31,586,102	39,226,925
<i>Fixed assets</i>											
Land	-	-	-	-	-	-	-	-	-	-	-
Building/Infrastructure	76,390	68,751	61,112	53,473	45,834	38,195	30,556	22,917	15,278	7,639	-
Furniture & fixtures	590,000	501,500	413,000	324,500	236,000	147,500	59,000	898,925	764,087	629,248	494,409
Office vehicles	1,192,500	1,013,625	834,750	655,875	477,000	298,125	119,250	1,816,896	1,544,361	1,271,827	999,293
Office equipment	759,000	645,150	531,300	417,450	303,600	189,750	75,900	1,438,769	1,222,953	1,007,138	791,323
Repair Tools	696,000	466,320	236,640	922,431	613,366	311,260	1,213,303	806,779	409,410	1,595,896	1,061,183
Security against building	375,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000
Total Fixed Assets	3,688,890	3,070,346	2,451,802	2,748,729	2,050,800	1,359,830	1,873,009	5,359,286	4,331,090	4,886,748	3,721,207
<i>Intangible assets</i>											
Pre-operation costs	334,989	267,991	200,993	133,996	66,998	-	-	-	-	-	-
Total Intangible Assets	334,989	267,991	200,993	133,996	66,998	-	-	-	-	-	-
TOTAL ASSETS	4,648,879	5,186,856	6,515,997	8,629,436	11,365,311	14,775,404	18,930,667	24,147,911	29,783,419	36,472,850	42,948,132
Liabilities & Shareholders' Equity											
<i>Current liabilities</i>											
Accounts payable	-	231,429	253,877	278,503	305,518	335,153	367,663	403,326	442,449	485,367	532,447
Total Current Liabilities	-	231,429	253,877	278,503	305,518	335,153	367,663	403,326	442,449	485,367	532,447
<i>Other liabilities</i>											
Total Long Term Liabilities	-	-	-	-	-	-	-	-	-	-	-
<i>Shareholders' equity</i>											
Paid-up capital	4,648,879	4,648,879	4,648,879	4,648,879	4,648,879	4,648,879	4,648,879	4,648,879	4,648,879	4,648,879	4,648,879
Retained earnings	-	306,549	1,613,241	3,702,054	6,410,914	9,791,372	13,914,125	19,095,705	24,692,091	31,338,604	37,766,806
Total Equity	4,648,879	4,955,428	6,262,120	8,350,933	11,059,793	14,440,251	18,563,004	23,744,584	29,340,970	35,987,483	42,415,685
TOTAL CAPITAL AND LIABILITIES	4,648,879	5,186,856	6,515,997	8,629,436	11,365,311	14,775,404	18,930,667	24,147,911	29,783,419	36,472,850	42,948,132

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
<i>Operating activities</i>											
Net profit		383,186	1,710,002	3,014,326	4,311,588	5,828,301	7,601,284	9,955,506	11,769,409	14,481,164	15,869,904
Add: depreciation expense		618,544	618,544	618,544	697,929	690,969	690,969	668,313	1,028,196	1,028,196	1,165,541
amortization of pre-operating costs		66,998	66,998	66,998	66,998	66,998	-	-	-	-	-
Pre-paid building rent	(125,000)	(12,500)	(13,750)	(15,125)	(16,638)	(18,301)	(20,131)	(22,145)	(24,359)	(26,795)	294,743
Accounts payable		231,429	22,449	24,626	27,015	29,635	32,510	35,663	39,123	42,918	47,081
Other liabilities		-	-	-	-	-	-	-	-	-	-
Cash provided by operations	(125,000)	1,287,656	2,404,243	3,709,369	5,086,893	6,597,602	8,304,632	10,637,338	12,812,369	15,525,483	17,377,269
<i>Financing activities</i>											
Issuance of shares	4,648,879	-	-	-	-	-	-	-	-	-	-
Cash provided by / (used for) financing activities	4,648,879	-	-	-	-	-	-	-	-	-	-
<i>Investing activities</i>											
Capital expenditure	(4,023,879)	-	-	(915,471)	-	-	(1,204,148)	(4,154,590)	-	(1,583,855)	-
Cash (used for) / provided by investing activities	(4,023,879)	-	-	(915,471)	-	-	(1,204,148)	(4,154,590)	-	(1,583,855)	-
NET CASH	500,000	1,287,656	2,404,243	2,793,898	5,086,893	6,597,602	7,100,484	6,482,748	12,812,369	13,941,628	17,377,269

13. KEY ASSUMPTIONS

13.1. Operating Cost Assumptions

Table 28: Operating Cost Assumptions

Description	Details
Building rent growth rate	10%
Inflation rate	10.1%
Wage growth rate	9.7%
Electricity price growth rate	9%
Office equipment price growth rate	9.6%
Office vehicle price growth rate	6.2%

13.2. Revenue Assumptions

Table 29: Revenue Assumptions

Description	Details
Sale price growth rate	10.1%
Initial capacity utilization	50%
Capacity growth rate	5%
Maximum capacity utilization	90%

13.3. Financial Assumptions

Table 30: Financial Assumptions

Description	Details
Project life (Years)	10
Debt: Equity	0:100
Discount Rate used for NPV (100% Equity)	25%
Discount Rate used for NPV(50:50 Debt: Equity)	18%

13.4. Cash Flow Assumptions

Table 31: Cash Flow Assumptions

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

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
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