



Pre-feasibility Study

PRODUCTION UNIT OF CIDER & VINEGAR

October 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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2. EXECUTIVE SUMMARY

The cider and vinegar production industries are rapidly growing in Pakistan as well as in other countries of the world. The production of cider and vinegar has been transformed from home-operated informal units to large scale formal manufacturing units; with numerous manufacturing units working all across the country.

The proposed cider and vinegar production unit aims to provide healthy and organic products; to meet preferences and tastes of customers. The proposed production Unit for cider and vinegar (herein referred to as proposed unit/proposed business) will produce apple cider and white vinegar. The main difference between apple cider and apple cider vinegar is that apple cider vinegar is fermented into alcohol and then converted into acetic acid, whereas cider is more akin to apple juice. Currently, apple cider and white vinegar are produced by both many small local units and large manufacturing units in the country.

White vinegar is a solution typically consisting of 5-10% acetic acid and 90–95% water, though types with higher acetic acid content are also available for agricultural or cleaning purposes. Apple cider (also called sweet apple cider or soft apple cider or simply apple cider) is an unfiltered, unsweetened, non-alcoholic beverage made from fruits. Most commonly used cider is apple cider.

This “Pre-feasibility Document” provides details for setting up “Production Unit of Cider & Vinegar” to supply high quality produce apple cider and white vinegar. The proposed production unit may be established anywhere in Pakistan but it is preferable to establish it in the areas where apple is grown. In case it is established in cities away from apple growing areas, there will be an additional transportation cost involved to bring the raw material to the production facility. The proposed unit may be established in cities like Karachi, Lahore, Peshawar, Rawalpindi, Quetta, Faisalabad, Murree, Mastung, Sargodha, Gilgit, Muzaffarabad, Mardan, Mansehra, Abbottabad, Swat, Dir Upper, Chitral, Kurram, South Waziristan, Pishin, Killa Abdullah, Loralai, Barkhan, Zhob, Killa Saifullah, Ziarat, Khuzdar, Hunza, etc. The target customers of the proposed unit are retails shops, malls, restaurants and general public.

The proposed unit has annual capacity of producing 480,000 liters of white vinegar and 162,000 liters of apple cider. The starting capacity utilization for both White Vinegar and Apple Cider in the first year of operations is assumed to be 50% which translates into 240,000 liters of white vinegar and 81,000 liters of apple cider. The maximum capacity utilization is assumed to be 90% for both white vinegar and apple cider.

The proposed project will be set up in a rented building having an area of 4,500 sq. ft. (1 Kanal). The proposed project requires a total investment of PKR 21.33 million. This includes capital investment of PKR 19.17 million and working capital of PKR 2.16 million. This project is financed through 100% equity. The Net Present Value (NPV) is PKR 64.59 million with an Internal Rate of Return (IRR) of 50% and a

Payback period of 2.69 years. Further, this project is expected to generate Gross Annual Revenues of PKR 36.39 million during first year, Gross Profit (GP) ratio ranging from 63% to 73% and Net Profit (NP) ratio ranging from 14% to 32% during the projection period of 10 years. The proposed project will achieve its estimated breakeven point at capacity of 36% (228,147 liters) with annual revenue of PKR 25.87 million.

The proposed project may also be established using leveraged financing. At 50% financing at a cost of KIBOR+3%, the proposed "Production unit of Cider and Vinegar" provides Net Present Value (NPV) of PKR 74.02 million, Internal Rate of Return (IRR) of 49% and Payback period of 2.72 years. Further, this project is expected to generate Net Profit (NP) ratio ranging from 13% to 32% during the projection period of ten years. The proposed project will achieve its estimated breakeven point at capacity of 36% (230,179 liters) with annual revenue of PKR 26.09 million.

The proposed project will provide employment opportunities to 48 people including the owner. The legal business status of this project is proposed as "Sole Proprietorship" or "Partnership".

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 establishing a "Production Unit of Cider & Vinegar". 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.

5. BRIEF DESCRIPTION OF PROJECT & SERVICES

This document provides details for establishing a production unit for cider and vinegar. Apple cider and white vinegar manufacturing is categorized under sauces, dressings and condiments industry in Pakistan. These products are added to food to give it more flavor. They are also used as food dressing.

Apple cider and white vinegar have many therapeutic benefits also. They are beneficial to relieve inflammation of stomach and are also used as mouth wash and as agents to reduce tooth ache and to strengthen the gums. They are also used in food preparations to control blood sugar level, reduce weight and are also useful as antimicrobial agents.

Apple cider and white vinegar are culinary¹ staple in kitchen. They can be used in pickles, salads as marinates to give an extra zing of flavor and act as a tenderizing agent in seafood, meat and sauces. They are also used in cheese making process. Apple cider and white vinegar are also used as effective food preservatives.

¹Culinary Staple: Relating to the kitchen or cooking, food that is eaten routinely and, in such quantities, that it constitutes a dominant portion of a standard diet for a given person

Apple cider is produced through fermentation process of fruit pulp and its juice in barrels which may be made of steel, glass or wood. Plastic and metal barrels are not used in fermentation process because they can react with acids and disturb the fermentation process. Most commonly, wooden barrels are used for this purpose. The proposed project also uses wooden barrels. Fermentation is carried out in a cool and dark place. Usually, the process takes from 30 to 31 days. The complete process for making apple cider may take 31 days. Due to seasonal restriction of apples, the proposed project of apple cider will operate for 4 months.

White vinegar is made by mixing acetic acid with water, sugar, salt and citric acid. The complete process for making white vinegar may take from 10 minutes to one hour depending upon the quantity being produced.

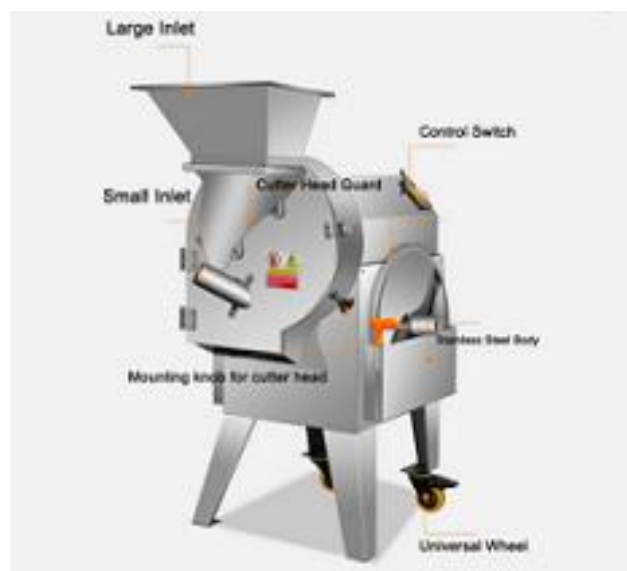
5.1. Machinery and Equipment

Machinery and equipment required for establishing a “Production Unit of Cider and Vinegar” are briefly discussed below:

Automatic Fruit Cutting Machine

This multi-functional cutting machine is suitable for cutting all kinds of fruits. It is a low consumption and high efficiency machine. It is used in kitchens, restaurants, cooking schools, hotels and food processing plants. The proposed business will use this machine for cutting apples into 4 slices. Its material is made up of stainless steel. Its capacity is 500 kg/hour and electricity consumption is 1,600W. Figure 1 shows automatic fruit cutting machine.

Figure 1: Automatic Fruit Cutting Machine



Pulp Maker Machine

This machine is used to make fruit pulp and its juice. The machine's part which contacts the fruits is made of stainless steel. This is important to keep the product safe from any contaminants. It is widely used in fruit processing industry. The

proposed business will use it to extract pulp and juice from apple. Its capacity is 500kg/hour and electricity consumption is 1500W. Figure 2 shows apple pulp maker machine.

Figure 2: Apple Pulp Maker Machine



Oak Barrel

Oak barrel is used to store apple pulp and juice for fermentation process to take place. Oak barrel would normally be imported. Plastic and metal barrels are not used in fermentation process because they can react with acids and disturb the fermentation process; therefore, oak barrels are preferred. Apple cider goes through subtle² chemical changes throughout the time it is stored in the oak barrel. Each oak barrel has a storage capacity of 500 liter. However, for the proposed project, each barrel is to be filled at 90% so as to leave 10% open space for sufficient air flow required for fermentation. Figure shows an oak barrel.

Figure 3: Oak Barrel



² Subtle Changes: not immediately obvious or comprehensible

Electric Hand Mixer

It is a tool for mixing apple pulp and juice in the oak barrel. The proposed business will use it to mix apple pulp and juice to ensure that pulp remains completely submerged during the fermentation process. It is made of stainless steel. Its electricity power is 950 W, paddle size of 120 mm, paddle length of 590 mm and a speed range of 350-700 rpm³. Figure 4 shows electric hand mixer.

Figure 4: Electric Hand Mixer



Pulp Presser Machine

Pulp Presser machine can press juice from fruits like apples, grapes, pomegranate etc. Pulp presser machine consumes low energy and has a compact structure which results in high efficiency. The proposed business will use it to compress mixture of apple pulp and juice comes out from barrels placed in fermentation area, so as to extract maximum juice from the mixture. It is made of stainless steel. Its required electricity consumption is 3,000 Watts and the capacity of this machine is 500 kg/hour. Figure shows pulp presser machine.

Figure 5: Pulp Presser Machine



³Revolution per minute

Juice Filtration Plant

Filtration plant is used for achieving clear filtration quality for apple cider. After filtration, refined apple cider is obtained which is ready for packing. The capacity of Juice Filtration Plant is 500 liter/hour of unpurified juice. It is made of stainless steel. Its power requirement is 750W. Figure 6 shows juice filtration machine.

Figure 6: Juice Filtration Plant



Bottle Filling and Capping Machine

This machine will automatically fill and cap white vinegar and apple cider bottles of different sizes of 100 ml⁴ to 1,000 ml. Its capacity is to fill and cap 50 bottles/minute. The electricity requirement of this machine is 3,800 Watts. Its material is made up of stainless steel. Figure 7 shows bottle filling and capping machine for white vinegar and apple cider.

⁴ milliliter

Figure 7: Bottle Filling and Capping Machine**Labeling Machine**

The proposed business will use this machine to glue labels on produced apple cider and white vinegar bottles. Its power is 250W and it can label 50 bottles/minute. Figure 8 shows labeling machine for white vinegar and apple cider.

Figure 8: Labeling Machine**Boiler Machine**

The proposed business will use a gas operated boiler for boiling apple cider. Its capacity is 500 Liter/hour. Its power consumption is 500W. It starts quickly and achieves high temperature in short time. Figure 9 shows boiler machine.

Figure 9: Boiler Machine**White Vinegar Generator Machine**

White vinegar generator machine will be used for preparing white vinegar. Addition and mixing of raw materials required for white vinegar will take place in this machine. It has a capacity of 200 Liter/hour. It is made of stainless steel. Its power consumption is 500 W. Figure 10 shows white vinegar generator machine.

Figure 10: White Vinegar Generator Machine

Large Tubs & Trolley (500Liter)

These tubs are used for moving apples from cutting department to crusher department. These are aging resistant and easy to clean. These tubs have a capacity of 500 Liter and are made of linear low-density polyethylene (LLDPE) material. Figure 11 shows large tubs.

Figure 11: Large Tubs & Trolley (500L)

**Plastic Tub (500L)-For Washing**

Proposed business will use plastic tubs for washing apples. The size used by proposed business is 500 Liter. Figure 12 shows plastic tub.

Figure 12: Plastic Tub (500L)

**Electronic Moveable Weighing Machine**

This machine will be mainly used for weighing apples. It has a capacity to weigh up to 500kg. Its power consumption is 25W. Figure 13 shows electronic moveable weighing machine.

Figure 13: Electronic Moveable Weighing Machine**Electronic Weighing Machine**

This machine will be used for measuring all raw materials other than apples, e.g., acetic acid, sugar, salt etc. Its capacity is 100kg and power consumption is 10W. Figure 14 shows electronic weighing machine.

Figure 14: Electronic Weighing Machine**Electricity Generator (Diesel)**

Electricity generator will be used to ensure uninterrupted production in case of any power outage. Capacity of generator for the proposed business would be 125 KW. Figure 15 shows generator.

Figure 15: Generator**Water Filtration Plant**

Water filtration plant will be used for filtering the water, which will be used in white vinegar and apple cider preparation. Its capacity is 1000 Liter/hour and weight is 35 kg. Its power consumption is 25W. Figure 16 shows water filtration plant.

Figure 16: Water Filtration Plant**Water Pump**

The proposed business will use the water pump to fulfill all the water needs of the production unit. It would provide water for washing apples, cleaning the production site and serve other general purposes. The required power input is 1,125 Watts. Figure 17 shows water pump.

Figure 17: Water Pump**Brix Hydrometer**

A hydrometer is an instrument used to measure the relative density of the liquids. This instrument measures the relative density of sugar in a solution. The proposed business will use this instrument to test the sugar level in apple cider. Figure 18 shows brix hydrometer.

Figure 18: Brix Hydrometer**Alcohol Refractometer**

The alcohol refractometer tests the alcohol concentration by volume (range up to 25% Volume). With a few drops of the sample on the testing prism, this meter is able to show the alcohol level in the concentration. In the proposed business, it is used to test the alcohol concentration by volume in apple cider as alcohol is also made during the fermentation process. The maximum acceptable percentage is $\leq 0.5\%$. Therefore, for assuring the alcohol concentration, alcohol refractometer is used. Figure 19 shows alcohol refractometer.

Figure 19: Alcohol Refractometer**Digital Automatic pH Meter**

A pH meter is used to measure acidity/alkalinity of a solution. A digital pH meter allows having more accurate pH measurements. The proposed business will use this meter to measure the acidity of white vinegar and apple cider. Figure 20 shows digital automatic pH meter.

Figure 20: Digital Automatic pH Meter**Drum Lifter**

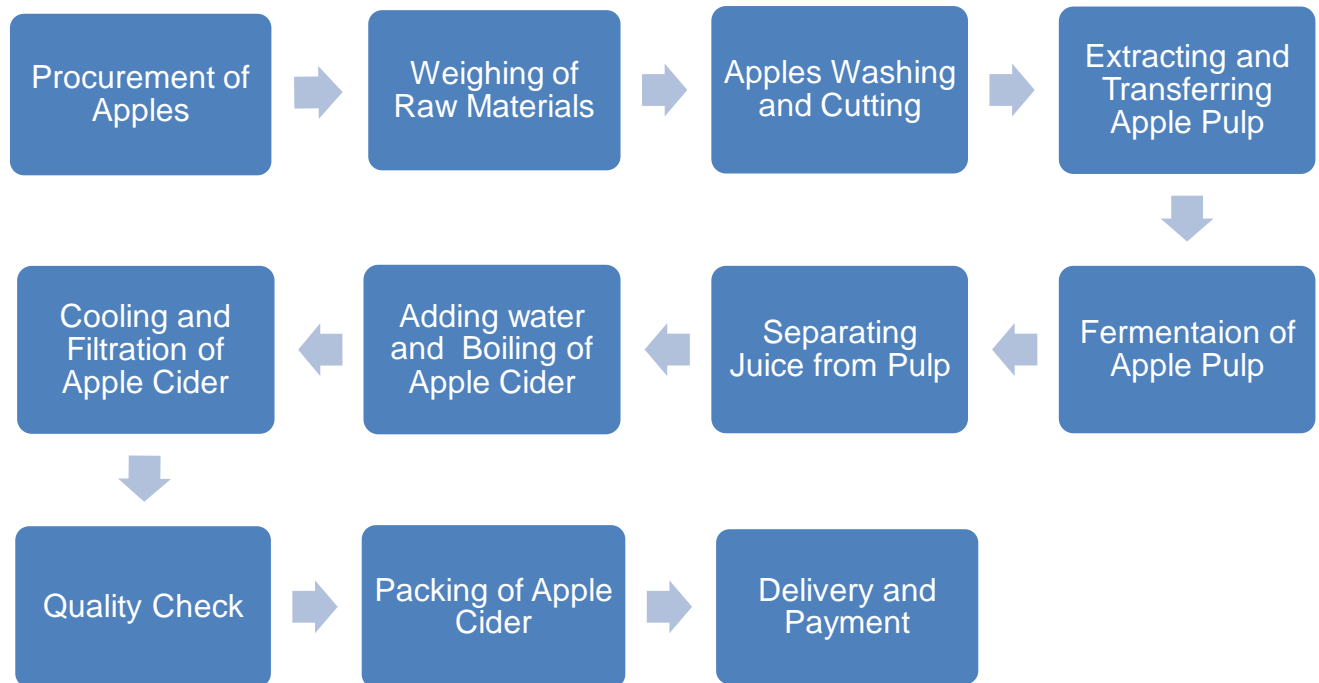
Drum Lifter is used to lift and move oak barrels. This equipment is manufactured with high strength steel which offers long lasting rough use. Figure 21 shows drum lifter.

Figure 21: Drum Lifter

5.2. Process Flow of Production Unit of Apple Cider

The process flow of production of apple cider is shown in Figure 22.

Figure 22: Process Flow of Production of Apple Cider



Brief description of the process flow is provided below:

Procurement of Raw Material (Apples)

Raw material for apple cider includes apples, water and sugar. These raw materials are procured from local suppliers, and are easily available in all local markets all across Pakistan. The management of the proposed unit will estimate the quantity and timing of procuring the raw material based on the production plan and available production capacity. An accurate procurement plan should be made due to apple being a seasonal fruit. Normal wastage of apples during procuring about 5% of total raw material cost. In Pakistan, the season for different varieties of apple starts from the first week of July and ends in mid of November. Due to this seasonality, the proposed project of apple cider will operate for 4 months. About 85% of total apple produced in Pakistan is picked from Balochistan. About 0.48 million tons apples are annually produced in Balochistan.⁵

There are different varieties of apple available in the country. The most suitable variety for making apple cider is the green apple; known as Shin Kulu or Golden

⁵Source: <http://www.mnfsr.gov.pk/frmDetails.aspx>

Delicious. This variety has a higher juice content and it also contains a compound called pectin, a fiber source that works to promote the growth of healthy bacteria. The pectin found in green apples can help breakdown foods more efficiently. The high fiber content in green apples can have other impact on digestive health as well. Along with Golden Delicious, other apple varieties may also be used for making apple cider; more common of which is Kala Kulu or Red Delicious.

Red Delicious apple is usually available at the start of August whereas, Golden Delicious is usually available by the end of September. Looking at the seasonality in apple availability, a duration of four months has been assumed for apple cider production.

The retail price for green apples is PKR 120 per kilogram but the proposed project will procure these apples in bulk quantity from apple farms at PKR 50 per kilogram. Apples are brought from the farm (or the fruit market) to the production unit on small trucks. Alternatively, loader rickshaw may also be used for this purpose.

Weighing of Raw Material

In this process, the procured raw materials are weighed to determine the total input in the production process.

Cutting and Washing

After weighing, the apples received at the unit are unloaded into plastic tubs and submerged in water for washing and cleaning. After that, the apples are shifted to the cutting section through trolleys. Automatic fruit cutting machine is used for slicing the apples into small pieces. The cut apples are transferred to the pulping section.

Extracting and Transferring Apple Pulp

In pulping section, apples are crushed in a pulp making machine. The machine has a capacity of 500 kg/hour. After crushing, the pulp and juice flows through two different channels of the machine and is collected separately in containers. Both pulp and juice is moved into the wooden oak barrels and mixed together to carry out fermentation process.

Fermentation of Apple Pulp

There are two fermentation methods aerobic and anaerobic. Aerobic fermentation is done in the presence of oxygen while in anaerobic fermentation; air is removed from the container before starting the fermentation process. Anaerobic fermentation is used in making wine and alcohol. The proposed unit uses aerobic fermentation as the desired product is non-alcoholic.

Apple pulp and juice is transferred into oak barrels. Each barrel is filled only for 90% of its total volume. 10% empty space permits sufficient air flow required for fermentation. These oak barrels are stored in fermentation room which is kept cool, dry and dark for achieving good results.

Sugar level would be checked with a brix⁶ hydrometer and accordingly sugar or water is added to attain the desired 15% sugar level. The mouths of the barrels are covered with a cheese cloth⁷ so that air circulation in and out of the barrel is not prevented. The barrel is left for 31 days for fermentation process to complete. The barrels are placed on the floor in line and are not stacked up due to the requirement for their regular checking. During this period, initially after around 5 days daily and afterwards on alternate days, it is checked that the pulp remains completely submerged in apple juice. Electric hand mixer is used for stirring or pushing the pulp into the juice.

- **Production Capacity of Apple Cider**

For production of apple cider, fermentation is the bottleneck operation and thus determines the capacity of the whole production facility. The proposed project is using fermentation room of 1,500 sq. ft which can hold 90 barrels at a time. One barrel takes space of 12.5 sq. feet and for 90 barrels the required space is 1125 sq. feet. The remaining space will be used as empty space to move barrels in and out of fermentation room. Fermentation process takes from 30 to 31 days to complete. The proposed project will put 3 barrels of 500 liters per day in the fermentation room and complete the cycle of 90 barrels in 30 to 31 days.

Separating Juice from Pulp

Completion of fermentation process is indicated by the formation of a gelatinous⁸ substance on the top layer of the mixture, known as “Mother of White Vinegar”. The gelatinous substance is removed with the help of a strainer. Mother of white vinegar can be preserved and used in future to quick-start the fermentation process.

The mixture is filtered to separate juice from pulp using pulp presser machine. Drum of pulp presser is wrapped with cheese cloth from inside and pulp is transferred into it to extract juice content within it. The juice is then collected in a food grade plastic drum. However, during this phase, about 50% apple cider (juice) is collected and there is 50% loss in the form of left over fruit pulp. This fruit pulp can also be sold to cattle farms where it may be used as fodder.

Adding Water and Boiling of Apple Cider

Due to the thickness of produced apple cider (juice) (such like honey), about 50% water is added to make it to light and also water is added into the drum until the sugar level drops to at least 5% and alcohol-volume percentage drops to less than or equal to 0.5%. Alcohol level is monitored using alcohol refractometer. Next, the drum is emptied into an industrial boiler where it is boiled for 30 to 45 minutes at 100

⁶Brix (symbol °Bx) is the sugar content of an aqueous solution. One-degree Brix is 1 gram of sucrose in 100 grams of solution

⁷ Cheese cloth is a thin, loosely woven, un-sized cotton cloth, used typically for light clothing and in preparing or protecting food.

⁸Having the consistency of jelly

degrees centigrade. During boiling, sugar level is checked to keep it at less than or equal to 5%.

Cooling and Filtration of Apple Cider

After boiling, the in-process apple cider is cooled down. This boiling-cooling process also kills the germs and unwanted bacteria. Cooled mixture is then moved towards the filtration plant, where it is filtered. The unfiltered apple cider is fed into central part of the machine giving high pressure. The filter media filters the liquid when the whole apple cider spreads out equally on each plate. Impurities remain on filter media and refined filtrate apple cider is collected in the shell, which then comes out at the outlet. Impurities are removed and stored in the form of a compressed cake. After completing filtration process, the cake is cleaned from filter material and can be recycled.

Quality Check

After filtration, the apple cider goes through a final quality check. Using a brix hydrometer, the sugar level/percentage is checked to ensure that it is within the acceptable level/percentage of less than or equal to 5%. However, any difference in sugar level can be adjusted with addition of water or sugar. Simultaneously, the alcohol refractometer is used to check alcohol-volume percentage in apple cider to ensure that it is within the acceptable range of less than or equal to 0.5%.

pH meter is used to check pH value; the acceptable acidic range is 2-4. If pH value is out of range (above 4) it can be adjusted by adding acetic acid. In case pH value is below 2, it can be adjusted by adding water.

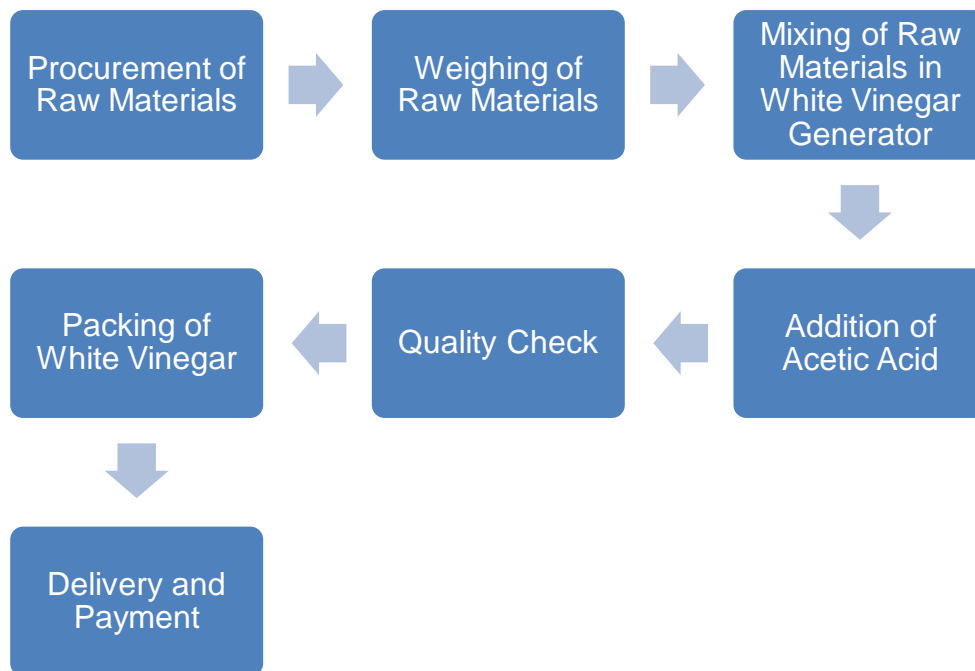
Packing of Apple Cider

After final filtration and quality check, the apple cider is transferred into the filling and capping machine manually. The filling machine fills the apple cider bottles of different sizes; 100 ml, 250 ml, 500 ml, 750 ml and 1,000 ml. Bottles are precisely capped and then passed through a labeling machine to put the label on them. The finished products are packed in carton boxes and moved into the finished goods store.

5.3. Process flow for Production Unit of White Vinegar

The process flow for production white vinegar is shown in Figure 23.

Figure 23: Process Flow of Production of White Vinegar



Brief description of the process flow is provided below:

Procurement of Raw Material

Raw materials for white vinegar include filtered water, citric acid, salt (common salt), sugar and acetic acid. These raw materials are procured from the local suppliers and transferred to the proposed unit by loader rickshaw. All of these ingredients are easily available in all cities of Pakistan.

Weighing of Raw Material

In this process, the procured raw materials are weighed to get the required quantities of raw materials for the production process.

Mixing of Raw Material in White Vinegar Generator

Filtered water, used in production of vinegar, is obtained from a water filtration plant. Filtered water, citric acid, salt and sugar are added in the white vinegar generator machine (a mixing tank with an agitator). All ingredients are mixed in the generator for 25 to 30 minutes to complete the process.

Addition of Acetic Acid

Acetic acid is added into the prepared mixture and mixing is continued in the generator for another 30 minutes; after which the white vinegar is ready. In this way, the total time required for mixing step is around 60 minutes.

Quality Check

Acidity level is checked with pH meter to ensure that the pH is maintained between 2 and 4. This range is suitable for a fine quality white vinegar. However, if the value falls beyond the range, it is adjusted. If it falls below 2, water is added and if it increases above 4, acetic acid is added.

Packing of White Vinegar

The prepared white vinegar is transferred into the filling and capping machine manually. The machine fills and caps the white vinegar bottles of different sizes; 100 ml, 300 ml and 800 ml. Bottles are transferred to labeling machine to put labels on them. The bottles are packed in carton boxes and finished products are moved to the finished goods store.

Delivery and Payment

The product is delivered to the customers through loader rickshaw. Usually, the payment is received in cash but for large orders and standing clients, the proposed business allow a credit period of 30 days.

5.4. Installed and Operational Capacities

The proposed business has a maximum capacity of producing 480,000 liters of white vinegar and 162,000 liters of apple cider in a year. However, during 1st year of operation, the proposed business is expected to attain 50% of its installed capacity for production of two products. This translates into production of 240,000 liters of white vinegar and 81,000 liters of apple cider in the 1st year of operations. The operational capacity utilization for white vinegar and apple cider is assumed to increase at the rate of 5%; maximum operational capacity of the unit being 90%. Table 1 shows details of maximum annual capacity and operational capacity utilized during 1st year of operations for white vinegar. Table 3 shows details of maximum annual capacity and operational capacity utilized during 1st year of operations for apple cider.

Table 1: Installed and Operational Capacity-White Vinegar

Capacity of Mixing Tank (Liters)	Time For Preparation (Minutes)	Total Number of Batches Produced Per Day (Batches)	Total Vinegar Produced Per Day (Liters)	Total Vinegar Produce Per Month (Liters)	Total Vinegar Produce Per Year at 100% Capacity (Liters)	Total Vinegar Produced Per Year at 50% Capacity (Liters)
200	60	8	1,600	40,000	480,000	240,000

Table 2: Installed and Operational Capacity – Bottle Wise (White Vinegar)

Total Vinegar Produced Per Year at 50% Capacity (Liters)	Products	Production Ratios	Liters (A)	Vinegar Per Bottle (ml) (B)	No of Bottles (A*1000)/B
240,000	100ml Bottle	15%	36,000	100	360,000
	300 ml Bottle	35%	84,000	300	280,000
	800ml Bottle	50%	120,000	800	150,000
Total					790,000



Table 3: Installed and Operational Capacity-Apple Cider

Production Capacity of Apple Cider Per Day (Liter) (A*D)	Time For Preparation of Apple Cider (Days)	Total Apple Cider Produce Per Month (Liters)	Total Apple Cider Produce Per Year at 100% Capacity (Liters)	Total Apple Cider Produce Per Year at 50% Capacity (Liters)
1,350	31	40,500	162,000	81,000

Oak Barrel Total Capacity (Liters)	Oak Barrel Filled Capacity (Liters)	Oak Barrel Stored in Fermentation Room Per Day (Barrels) (A)	After Fermentation & Pressing pulp and Juice Output at 50% (Liter) (B)	Addition of Water Before Boiling (Liter) (C)	Total Apple Cider Produced per Barrel (Liters) (D=B+C)
500	450	3	225	225	450

Table 4: Installed and Operational Capacity – Bottle Wise (Apple Cider)

Total Apple Cider Produce Per Year at 50% Capacity (Liters)	Products	Production Ratios	Liters (A)	Cider Per Bottle (ml) (B)	No of Bottles (A*1000)/B
81,000	100 ml Bottle	10%	8,100	100	81,000
	250 ml Bottle	15%	12,150	250	48,600
	500 ml Bottle	25%	20,250	500	40,500
	750 ml Bottle	15%	12,150	750	16,200
	1000 ml Bottle	35%	28,350	1,000	28,350
Total					214,650



6. CRITICAL FACTORS

Before making the decision to invest in establishing a “Production Unit for Cider and Vinegar” one should carefully analyze the associated risk factors. The important considerations in this regard include:

- The entrepreneur preferably should have prior technical knowledge of fermentation process.
- The business must comply with standards set by provincial Food Authorities and Pakistan Standards & Quality Control Authority (PSQCA) to obtain license.
- Availability of trained resources is very critical for production of apple cider and white vinegar.
- Competitive pricing and targeted marketing play an important role in attracting the target customers.
- Maintaining consistent quality of the apple cider and white vinegar is also critical in retaining the customers and securing reorders from the customers.
- Efficient procurement of apples is also very important to control cost and ensure product quality.

7. GEOGRAPHICAL POTENTIAL FOR INVESTMENT

The proposed production unit may be established anywhere in Pakistan but it is preferable to establish it in the areas where apple is grown. In case it is established in cities away from apple growing areas, there will be an additional transportation cost involved to bring the raw material to the production facility. The proposed unit may be established in cities like Karachi, Lahore, Peshawar, Rawalpindi, Quetta, Faisalabad, Murree, Mastung, Sargodha, Gilgit, Muzaffarabad, Mardan, Mansehra, Abbottabad, Swat, Dir Upper, Chitral, Kurram, South Waziristan, Pishin, Killa Abdullah, Loralai, Barkhan, Zhob, Killa Saifullah, Ziarat, Khuzdar, Hunza, etc. The target customers of the proposed unit are retail shops, malls, restaurants and general public.

8. POTENTIAL TARGET CUSTOMERS/MARKETS

The potential target customers of the proposed unit mainly comprise of wholesalers, big retail stores, small retailers, restaurants, hotels and fast food outlets. The demand of these target customers will be higher in cities where middle-income groups are larger in number. In large cities, wholesalers may sell to small retail shops and in small cities wholesalers may work as distribution agents.

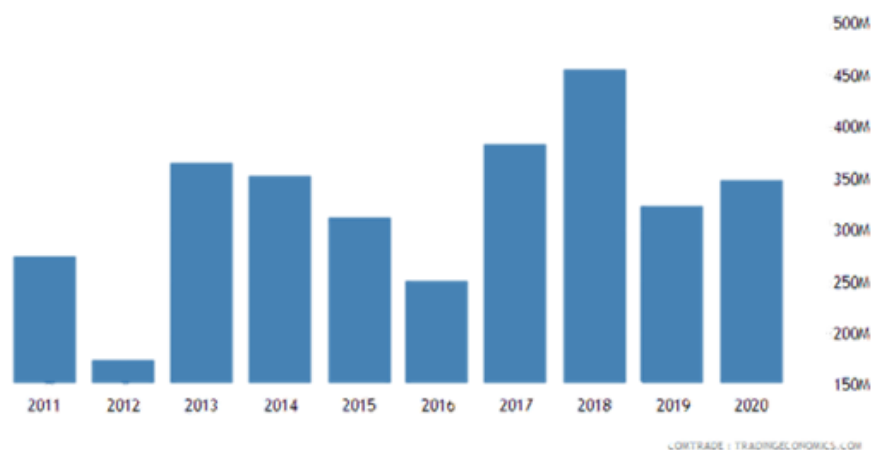
Due to presence of essential minerals, vitamins, acetic acid and citric acid, apple cider has applications in various commercial products. Apple cider and white vinegar are used as flavoring agent in different food preparations.

As the wellness trend continues to grow amongst consumers, various wellness companies are developing gummies⁹ and capsules containing apple cider powder. Along with apple cider and white vinegar applications in food and beverage and pharmaceutical products, several personal care companies are coming up with apple cider-based hair cleaners and face wash. Therefore, increased new product launch and application of apple cider in several industries are likely to expand market size.¹⁰

According to the United Nations COMTRADE database on international trade, in 2020, under the HS code 22, Pakistan's exports of beverages, spirits and white vinegar was US\$347.56 million. Figure 24 shows a graph of Pakistan Exports of beverages, spirits and white vinegar during the period from 2011 to 2020.¹¹

Currently, there are five major large manufacturers of white vinegar and apple cider in Pakistan; including Mitchell's Fruit Farms, National Foods, Shangrila Foods, Marhaba and Shezan International. Their production units are located in Lahore, Sheikhpura and Karachi. Currently, the production plants of these manufacturers are not located in apple-growing areas and these units are running sustainably. One of the reasons for this is that these units manufacture many other products along with apple cider and white vinegar. Establishing a unit based on manufacturing these two products will be more feasible in the areas where apples are produced. There are many other manufacturers of white vinegar and apple cider which are manufacturing these products on small scale.

Figure 24: Pakistan's 10 Years Export Graph



⁹broad category of gelatin-based chewable sweets

¹⁰<https://www.fortunebusinessinsights.com/apple-Apple-Cider-White-Vinegar-market-105136>

¹¹<https://tradingeconomics.com/pakistan/exports/beverages-spirits-White-Vinegar>

For the purpose of this study, the proposed project will only be targeting the local market and not targeting the export market due the requirement of export permit and branding cost.

9. PROJECT COST SUMMARY

A detailed financial model has been developed to analyze the commercial viability of the “Production Unit of Cider & Vinegar”. 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 considering the relevant assumptions and target market.

9.1. Initial Project Cost

Table 5 provides fixed and working capital requirements for establishment and operations of the “Production Unit of Cider & Vinegar”.

Table 5: Project Cost

Description of Costs	Amount (PKR)	Reference
Land	-	9.1.1
Building / Infrastructure	547,409	9.1.2
Machinery & Equipment	14,648,000	9.1.3
Furniture & Fixtures	1,245,000	9.1.4
Office Equipment	1,425,000	9.1.5
Office Vehicles	333,300	9.1.6
Security Against Building	750,000	9.1.7
Pre-operating Costs	222,345	0
Total Capital Cost	19,171,054	
Equipment spare part inventory	97,653	
Raw material inventory	60,581	
Cash	2,000,000	
Total Working Capital	2,158,234	
Total Project Cost	21,329,289	

9.1.1. Land

The proposed production unit of cider and vinegar will be established in a rented building to avoid the high cost of land. Generally, such businesses operate in basement facilities. Suitable location for setting up a production unit can be easily found on rent. Therefore, no land cost has been added to the project cost. Total space requirement for the proposed “Production Unit for Cider and Vinegar” has been estimated as 4,500 sq. feet (1 Kanal). The breakup of the space requirement is provided in Table 6.

Table 6: Breakup of Space Requirement

Description	% Breakup	Area (Sq. Ft.)
Executive Office	2%	100
Reception Area	2%	100
Staff Office Area	11%	500
White Vinegar Production Area	5%	225
White Vinegar Storage Area-Raw Material	3%	120
White Vinegar Storage Area-Finished Good	4%	180
Apple Cider-Washing Area	9%	400
Apple Cider-Crusher Area	4%	169
Apple Cider-Fermentation Room	33%	1,500
Apple Cider-Pulp Filtration Area	2%	107
Apple Cider-Boiling Area	3%	150
Apple Cider-Cooling & Filtering Area	4%	195
Bottle Filling & Packing Area	7%	300
Apple Cider Storage Area-Finished Good	5%	238
Washrooms	5%	216
Total	100%	4,500

9.1.2. Building

There will be no cost of building since the business 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 15-16 KW for which an electricity connection under the industrial tariff three phase will be required. Building rent of PKR 250,000 is included in the operating cost. Table 7 provides details of building renovation cost.

Table 7: Building Renovation Cost

Cost Item	Unit of Measurement (UOM)	Total Units	Cost/Unit (PKR)	Total Cost (PKR)
Paint Cost	Liter	124	500	61,803
Labour Cost	Feet	12,361	10	123,606
Wall Racks	Sq.Feet	24	15000	360,000
Blinds		1	2000	2,000
Total (PKR)				547,409

9.1.3. Machinery and Equipment Requirement

Table 8 provides details of machinery and equipment required for establishing Production Unit of Cider & Vinegar.

Table 8: Machinery and Equipment Requirement

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
White Vinegar Generator Machine (200 Liter/Batch)	1	150,000	150,000
Electronic Movable Weighing Machine (500 Kg)-Apple Cider	1	30,000	30,000
Weighing Scale (100 Kg)-White Vinegar	1	5,000	5,000
Automatic Fruit Cutting Machine (500 Kg/Hour)	1	110,000	110,000
Large Tubs (500 Liter) (For Washing)	5	6,500	32,500
Trollies (500 Liter)	4	12,000	48,000
Alcohol Refractometer	5	4,000	20,000
Water Filtration Plant	1	60,000	60,000
Digital Automatic pH Meter	5	2,000	10,000
Brix Hydrometer	5	700	3,500
Manual Drum Lifter (500Kg)	1	27,000	27,000

Apple Pulp Maker Machine (500 Kg/Hour)	1	700,000	700,000
Pulp Presser Machine (500 Kg/Hour)	1	200,000	200,000
Juice Filtration Machine (500 Liter/Hour)	1	80,000	80,000
Bottle Filling and capping Machine (50 BPM) (100ml-1000ml)	1	600,000	600,000
Labeling Machine (for Both) 50BPM)	1	300,000	300,000
Oak Barrel (500 Liter)	90	120,000	10,800,000
Electric Hand Mixer	4	5,500	22,000
Boiler Machine (500 Liter/Hour)	1	430,000	430,000
Generator (125 KW)	1	1,000,000	1,000,000
Water Suction Pump (1.5 Hp)	1	20,000	20,000
Total Cost (PKR)			14,648,000

9.1.4. Furniture & Fixtures Requirement

Table 9 provides details of the furniture and fixture requirement of the project.

Table 9: Furniture and Fixtures Requirement

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Owner Tables	1	30,000	30,000
Owner Chairs	1	20,000	20,000
Staff Chairs	50	10,000	500,000
Staff Tables	12	25,000	300,000
Sofa Sets	1	35,000	35,000
Wall Racks for Finished Products	24	15,000	360,000
Total (PKR)			1,245,000

9.1.5. Office Equipment Requirement

Details of office equipment required for the project is provided in Table 10.

Table 10: Office Equipment Requirement

Cost Item	No.	Unit Cost (PKR)	Total Cost(PKR)
Laptop	5	80,000	400,000
Desktop Computer	5	40,000	200,000

Printer	2	40,000	80,000
LED/LCD (Surveillance)	2	40,000	80,000
Water Dispenser	2	20,000	40,000
Ceiling Fan	21	5,000	105,000
Wi-Fi / Internet Routers	1	5,000	5,000
Exhaust Fan	33	3,000	99,000
1.5 ton Air Conditioner	4	90,000	360,000
Security Cameras - 2MP	16	2,000	32,000
Digital Video Recorder (DVR)	2	12,000	24,000
Total Cost (PKR)			1,425,000

9.1.6. Office Vehicle Requirement

Details of office vehicle required for the project is provided in Table 11.

Table 11: Office Vehicle Requirement

Cost Item	No.	Unit Cost (PKR)	Registration fee @ 1%	Total Cost (PKR)
Loader Rickshaw	1	250,000	2500	252,500
Motorcycle	1	80,000	800	80,800
Total Cost (PKR)				333,300

9.1.7. Security against Building

Details of security against building for the project are provided in Table 12.

Table 12: Security against Building

Cost Item	No. of Months	Unit Cost (PKR)	Total Cost (PKR)
Security Against Building	3	250,000	750,000
Total (PKR)			750,000

9.1.8. Pre-Operating Cost

Details of pre-operating cost for the project are provided in Table 13.

Table 13: Pre-Operating Cost

Cost Item	Number / Months	Hiring before Year 0	Unit Cost (PKR)	Total Cost (PKR)
Production Supervisor-White Vinegar	1	1	50,000	50,000
Marketing Officer	1	1	40,000	40,000
Skilled Labor-White Vinegar	1	1	25,000	25,000
Unskilled Labor-White Vinegar	1	1	20,000	20,000
Office Boy	1	1	20,000	20,000
Security	1	1	20,000	20,000
Utilities expense				47,345
Total (PKR)				222,345

9.2. Breakeven Analysis

Breakeven analysis is provided in Table 14.

Table 14: Breakeven Analysis

Particulars	Amount First Year (PKR)	Ratios
Sales	36,397,260	100%
Variable Cost	14,853,960	41%
Contribution	21,543,300	59%
Fixed Cost	15,251,578	42%
Breakeven		
Breakeven (Liters)		227,252
Breakeven Revenue (PKR)		25,767,437
Breakeven Capacity		35%

9.3. Revenue Generation

Table 15 and Table 16 provides details for revenue generation of the Production Unit of Cider and Vinegar during the first year of operations, based on 50% capacity utilization for white vinegar and apple cider.

Table 15: Revenue Generation-White Vinegar

Total Vinegar Produce Per Year at 100% Capacity (Liters)	Total Vinegar Produce Per Year at 50% Capacity (Liters)	Products	Ratios	Price (PKR)	Liters (A)	Vinegar Per Bottle (ml) (B)	No of Bottles (A*1000)/B	Revenue (PKR)
480,000	240,000	100ml Bottle	15%	20	36,000	100	360,000	3,450,000
		300 ml Bottle	35%	55	84,000	300	280,000	7,379,167
		800ml Bottle	50%	140	120,000	800	150,000	10,062,500
480,000	240,000				240,000		790,000	20,891,667

Table 16: Revenue Generation-Apple Cider

Total Apple Cider Produce Per Year at 100% Capacity (Liters)	Total Apple Cider Produce Per Year at 50% Capacity (Liters)	Products	Ratios	Price (PKR)	Liters (A)	Cider Per Bottle (ml) (B)	No of Bottles (A*1000)/B	Revenue (PKR)
162,000	81,000	100 ml Bottle	10%	40	8,100	100	81,000	1,552,500
		250 ml Bottle	15%	105	12,150	250	48,600	2,445,188
		500 ml Bottle	25%	200	20,250	500	40,500	3,881,250
		750 ml Bottle	15%	300	12,150	750	16,200	2,328,750
		1000 ml Bottle	35%	390	28,350	1,000	28,350	5,297,906
162,000	81,000				81,000		214,650	15,505,594

9.4. Variable Cost Estimate

Variable costs of the project have been provided in detail in Table 17.

Table 17: Variable Cost Estimate

Description of Costs	Total Cost (PKR)
Raw Material Cost-White Vinegar	726,973
Bottling Cost-White Vinegar	1,691,458
Labelling Cost -White Vinegar	353,385
Carton Packing Cost-White Vinegar	1,110,069
Raw Material Cost - Apple Cider	2,044,125
Other Raw Material Cost- Apple Cider	112,556
Bottling Cost - Apple Cider	502,622
Labelling Cost - Apple Cider	101,883
Carton Packing Cost- Apple Cider	279,773
Utilities Cost	194,432
Generator Fuel Cost	58,330
Direct Labor	5,080,000
Machinery Maintenance – Cost	1,171,840
Gas expense	204,413
Fuel Cost	181,986
Communications expense (phone,mail, internet, etc.)	396,000
Office vehicles running expense	332,640
Office expenses (stationery, entertainment etc.)	396,000
Total Variable Cost (PKR)	14,938,485

Table 18: White Vinegar Batch Cost

Cost Item	Unit of Measurement (UOM)	Raw Material Required per Liter (Kg)	Batch Capacity (Liters)	Cost Per Kg (PKR)	Raw Material Required Per Batch (Kg)	Total Cost per Batch (PKR)
Water	Liter	1	200	-	200	-
Citric Acid	Kg	0.00225		350	0.5	158
Salt	Kg	0.0034		10	1	7
Sugar	Kg	0.001		100	0.2	20
Acetic Acid	Kg	0.012		450	2	1,080
Cost Per Batch (PKR)						1,264
Cost Per Liter (PKR)						6.32

Table 19: Apple Cider Barrel Cost

Cost Item	Unit of Measurement (UOM)	Apple Quantity Per Barrel (Kg)	Wastage of Fruit (5%)	Apple Per Barrel at Filled Capacity (Kg)	Apple Cost Per Kg (PKR)	Total Cost Per Barrel (PKR)
Apple	Kg	474	24	450	50	23,700
Total Cost Per Barrel (PKR)						23,700
Cost Per Liter (PKR)						52.67

Table 20: Other Raw Material Cost – Apple Cider

Cost Item	Unit of Measurement (UOM)	Average Quantity Required Per Barrel (Kg)	Cost Per Kg (PKR)	Total Cost Per Barrel (PKR)
Sugar	Kg	9	100	900
Acetic Acid	Kg	0.9	450	405
Total Cost Per Barrel (PKR)				1,305
Cost Per Liter (PKR)				2.9



Table 21: Raw Material Cost - White Vinegar

Items	Material Cost Per Bottle (PKR)	No. of Bottles Sold	Total Cost (PKR)
100 ml Bottle	0.63	172,500	109,046
300 ml Bottle	1.90	134,167	254,440
800 ml Bottle	5.06	71,875	363,486
Total Cost (PKR)			726,973

Table 22: Bottling Cost - White Vinegar

Items	Bottle Cost Per Unit (PKR)	No. of Bottles Sold	Total Cost (PKR)
100 ml Bottle	3	172,500	517,500
300 ml Bottle	5	134,167	670,833
800 ml Bottle	7	71,875	503,125
Total Cost (PKR)			1,691,458

Table 23: Labeling Cost - White Vinegar

Items	Labelling Cost Per Bottle (PKR)	No. of Bottles Sold	Total Cost (PKR)
100 ml Bottle	0.75	172,500	129,375
300 ml Bottle	1	134,167	134,167
800 ml Bottle	1.25	71,875	89,844
Total Cost (PKR)			353,385

Table 24: Carton Packing Cost - White Vinegar

Items	Bottles per carton	No. of Bottles Sold	Unit Cost (PKR)	Total Cost (PKR)
100 ml Bottle	24	172,500	25	179,688
300 ml Bottle	12	134,167	35	391,319
800 ml Bottle	6	71,875	45	539,063
Total Cost (PKR)				1,110,069

Table 25: Raw Material Cost - Apple Cider

Items	Material Cost Per Bottle (PKR)	No. of Bottles Sold	Total Cost (PKR)
100 ml Bottle	5.27	38,813	204,413
250 ml Bottle	13.17	23,288	306,619
500 ml Bottle	26.33	19,406	511,031
750 ml Bottle	39.5	7,763	306,619
1000 ml Bottle	52.67	13,584	715,444
Total Cost (PKR)			2,044,125

Table 26: Other Raw Material Cost – Apple Cider

Items	Other Material Cost Per Bottle (PKR)	No. of Bottles Sold	Total Cost (PKR)
100 ml Bottle	0.29	38,813	11,256
250 ml Bottle	0.73	23,288	16,883
500 ml Bottle	1.45	19,406	28,139
750 ml Bottle	2.18	7,763	16,883
1000 ml Bottle	2.9	13,584	39,395
Total Cost (PKR)			112,556

Table 27: Bottling Cost - Apple Cider

Items	Bottle Cost Per Unit (PKR)	No. of Bottles Sold	Total Cost (PKR)
100 ml Bottle	3	38,813	116,438
250 ml Bottle	4	23,288	93,150
500 ml Bottle	6	19,406	106,734
750 ml Bottle	7	7,763	50,456
1000 ml Bottle	10	13,584	135,844
Total Cost (PKR)			502,622

Table 28: Labeling Cost - Apple Cider

Items	Labelling Cost Per Bottle (PKR)	No. of Bottles Sold	Total Cost (PKR)
100 ml Bottle	0.75	38,813	29,109
250 ml Bottle	1	23,288	23,288
500 ml Bottle	1	19,406	19,406
750 ml Bottle	1.25	7,763	9,703
1000 ml Bottle	1.5	13,584	20,377
Total Cost (PKR)			101,883

Table 29: Carton Packing Cost - Apple Cider

Items	Bottles per carton	No. of Bottles Sold	Unit Cost (PKR)	Total Cost (PKR)
100 ml Bottle	24	38,813	25	40,430
250 ml Bottle	24	23,288	30	29,109
500 ml Bottle	12	19,406	35	56,602
750 ml Bottle	6	7,763	40	51,750
1000 ml Bottle	6	13,584	45	101,883
Total Cost (PKR)				279,773

Table 30: Direct Labor

Cost Item	No.	Unit Cost (PKR)	Total Cost (PKR)
Production Supervisor-White Vinegar	1	50,000	600,000
Production Supervisor-Apple Cider	1	50,000	250,000
Skilled Labor-White Vinegar	3	25,000	900,000
Unskilled Labor-White Vinegar	7	20,000	1,680,000
Skilled Labor-Apple Cider	6	25,000	750,000
Unskilled Labor-Apple Cider	9	20,000	900,000
Total (PKR)			5,080,000

Table 31: Variable cost Assumptions

Description of Costs	Rate	Rationale
Generator Fuel Cost	30%	of Utilities Cost
Machinery Maintenance – Cost	8%	of Cost of Machinery
Gas expense	10%	of Raw Material Cost Apple Cider
Fuel Cost	0.5%	of Revenue
Communications expense (phone, mail, internet, etc.)	5%	of administration expense
Office vehicles running expense	4.2%	of administration expense
Office expenses (stationery, entertainment etc.)	5%	of administration expense

9.5. Fixed Cost Estimate

Details of fixed cost for the project are provided in Table 32.

Table 32: Fixed Cost Estimate

Description of Costs	Amount (PKR)
Management Staff	7,920,000
Administration benefits expense	585,000
Building rental expense	3,000,000
Promotional expense	545,959
Depreciation expense	2,702,436
Utilities	373,714
Amortization of pre-operating costs	44,469
License, Permits, etc.	80,000
Total Fixed Cost (PKR)	15,251,578

Table 33: License, Permits, etc.*

Cost Item	No.	Fee (PKR)	Total Cost (PKR)
Punjab Food Authority	1	35,000	35,000
Employees Social Security Institution	25	1000	25,000
Pakistan Standards & Quality Control Authority (PSQCA)	2*	10000	20,000

Total Cost (PKR)			80,000
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License, Permits etc. are expense out annually as it is fixed as per the rules. The license fees for food authority may differ in different provinces. Sindh Food Authority license fee is PKR 20,000.

*One license is for white vinegar production and one for apple cider production.

Table 34: Fixed Cost Assumption

Description of Costs	Rate	Rationale
Administration benefit expense	4.5%	of administration expense
Promotional expense	1.5%	of revenue
Depreciation		
Machinery and Equipment	15%	of cost
Office Equipment/Office Vehicle/Furniture and Fixture	15%	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 35.

Table 35: Financial Feasibility Analysis

Description	Project
IRR	50%
NPV (PKR)	64,588,548
Payback Period (years)	2.69
Projection Years	10
Discount Rate used for NPV	15%

9.7. Financial Feasibility with 50% Debt Financing

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 36.

Table 36: Financial Feasibility Debt Financing

Description	Project
IRR	49%
NPV (PKR)	74,016,947
Payback Period (years)	2.72
Projection Years	10
Discount Rate used for NPV	13%

9.8. Human Resource Requirement

For the 1st year of operations, the human resource requirements are projected in Table 37.

Table 37: Human Resource Requirement

Post	No. of Employees	Monthly Salary (PKR)	Total Salary (PKR)
Accountant	1	60,000	720,000
Accounts Assistant	1	40,000	480,000
Production Supervisor-White Vinegar	1	50,000	600,000
Production Supervisor-Apple Cider	1	50,000	250,000
Procurement Officer	1	40,000	480,000
Mechanical Foreman	1	50,000	600,000
Receptionist	1	30,000	360,000
Sales Staff	2	40,000	960,000
Marketing Officer	1	40,000	480,000
Storekeeper	2	35,000	840,000
Skilled Labor-White Vinegar	3	25,000	900,000
Unskilled Labor-White Vinegar	7	20,000	1,680,000
Skilled Labor-Apple Cider	6	25,000	750,000
Unskilled Labor-Apple Cider	9	20,000	900,000
Quality Controller	1	40,000	480,000
Office Boy	2	20,000	480,000

Sweeper	3	20,000	720,000
Driver	2	25,000	600,000
Security	3	20,000	720,000
Total Cost (PKR)			13,000,000

10. CONTACT DETAILS

Details of suppliers of machinery and equipment are provided in Table 38.

Table 38: Contact Details

Name of Supplier/Manufacturers	Supplies	Contacts Number	Email Address
Smart Stainless Steel Fabricator (India)	Machine	+91-8048876862	
Barrels Direct (England)	Barrels		https://www.barrelsdirect.com/contact/
Zhangjiagang Wilford Thermal Co (China)	Machines	+86 17701567985	https://www.wilfordboiler.com/
Zhangjiagang King Machine Co (China)	Machines	+86-15262329858	https://www.king-machine.com/
Mitchell's Fruit Farms Limited (Lahore)	Apples	(042) 35872392	https://www.mitchells.com.pk/
Mohammad Afzal (Skardu)	Apples	0345-7498366	
Qutub-ul-Din Raisani (Ziarat)	Apples	0336 0206971	
Mr. Kazim Khan (Killa Abdullah)	Apples	0321 8001441	
Mohammad Younus Mughal (Kalat)	Apples	0333 2899778	
Abdullah Sugar Mills Limited (Okara)	Sugar	0307 6805452	https://www.hwgc.com.pk/abdulla_sugar_mill.htm
Khazana Sugar Mills Limited (Peshawar)	Sugar	0308 9486811	
Matiari Sugar Mills Limited (Hyderabad)	Sugar	0300 8250847	http://www.matiarisugar.com/
Mairaj Enterprises (Karachi)	Acetic Acid & Citric Acid	92-21-36037040	
International Petrochemical Pvt Ltd (Lahore)	Acetic Acid & Citric Acid	92-42-5888536	https://www.ipchem.com/

11. USEFUL LINKS

Table 39: Useful Links

Name of Organization	Website
Small and Medium Enterprises Development Authority (SMEDA)	www.smeda.org.pk
National Business Development Program (NBDP)	www.nbdp.org.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 Azad Jammu and Kashmir	www.ajk.gov.pk
Government of Gilgit Baltistan	www.gilgitbaltistan.gov.pk
Punjab Food Authority	www.pfa.gop.pk
Sindh Food Authority	www.sfa.gos.pk
Food Department Government of Balochistan	www.balochistan.gov.pk/tender-categories/food-department/
Food Safety and Halal Food Authority Khyber Pakhtunkhwa	www.kpfsa.gov.pk
Food Department of Azad Jammu and Kashmir	www.ajk.gov.pk
Food Department of Gilgit Baltistan	www.gilgitbaltistan.gov.pk
Small Industries Development Board	https://small_industries_de.kp.gov.pk/
Punjab Small Industries Corporation	https://www.psic.gop.pk/
Sindh Small Industries Corporation	https://ssic.gos.pk/
Directorate of Small Industries Balochistan	http://www.dgicd.gob.pk/

12. ANNEXURES

12.1. Income Statement

Calculations										
Income Statement										SMEDA
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue from White Vinegar	20,891,667	26,564,753	32,235,672	38,843,647	46,527,445	55,445,159	65,776,801	77,727,227	91,529,443	102,016,891
Revenue from Apple Cider	15,505,594	17,991,882	20,006,973	22,247,754	24,739,502	27,510,326	30,591,483	34,017,729	37,827,715	42,064,419
Grand Total Revenue	36,397,260	44,556,635	52,242,644	61,091,401	71,266,948	82,955,486	96,368,284	111,744,956	129,357,158	144,081,310
<i>Cost of sales</i>										
<i>White Vinegar</i>										
Total Raw Material Cost	726,973	914,959	1,098,965	1,310,744	1,554,026	1,833,005	2,152,404	2,517,533	2,934,364	3,237,250
Total Bottling Cost	1,691,458	2,128,850	2,556,978	3,049,729	3,615,776	4,264,882	5,008,032	5,857,585	6,827,430	7,532,160
Total Labelling Cost	353,385	444,767	534,213	637,160	755,421	891,034	1,046,296	1,223,787	1,426,411	1,573,645
Total Carton Packing Cost	1,110,069	1,397,121	1,678,092	2,001,475	2,372,960	2,798,954	3,286,669	3,844,213	4,480,702	4,943,202
Total	3,881,886	4,885,696	5,868,248	6,999,109	8,298,182	9,787,875	11,493,401	13,443,118	15,668,907	17,286,258
<i>Apple Cider</i>										
Total Raw Material Cost-Apples	2,044,125	2,347,722	2,584,059	2,844,188	3,130,503	3,445,640	3,792,501	4,174,280	4,594,491	5,057,003
Total Other Raw Material Cost	112,556	129,273	142,287	156,610	172,376	189,728	208,828	229,850	252,988	278,455
Total Bottling Cost	502,622	577,272	635,384	699,346	769,747	847,235	932,523	1,026,397	1,129,721	1,243,447
Total Labelling Cost	101,883	117,015	128,794	141,759	156,030	171,737	189,025	208,054	228,998	252,050
Total Carton Packing Cost	279,773	321,326	353,673	389,276	428,463	471,595	519,069	571,322	628,835	692,137
Total	3,040,959	3,492,608	3,844,197	4,231,180	4,657,118	5,125,935	5,641,946	6,209,902	6,835,032	7,523,092
Utilities Cost	194,432	216,378	240,704	267,659	297,519	330,591	367,211	407,749	452,615	493,516
Generator Fuel Cost	58,330	71,448	87,481	107,070	130,996	160,211	195,872	239,389	292,480	351,014
Direct Labor	5,080,000	4,651,280	5,102,454	5,597,392	6,140,339	6,735,952	7,389,340	8,106,105	8,892,398	9,754,960
Machinery Maintenance - Cost	1,171,840	1,289,805	1,419,646	1,562,557	1,719,854	1,892,986	2,083,547	2,293,290	2,524,148	2,778,246
Gas expense	204,413	255,988	307,219	368,702	442,491	531,047	637,325	764,873	917,948	1,101,657
Total cost of sales	13,631,859	14,863,204	16,869,948	19,133,669	21,686,501	24,564,597	27,808,640	31,464,427	35,583,527	39,288,742
Gross Profit	22,765,401	29,693,431	35,372,696	41,957,732	49,580,447	58,390,889	68,559,644	80,280,529	93,773,631	104,792,567
	63%	67%	68%	69%	70%	70%	71%	72%	72%	73%
<i>General administration & selling expenses</i>										
Management Staff	7,920,000	8,688,240	9,530,999	10,455,506	11,469,690	12,582,250	13,802,729	15,141,593	16,610,328	18,221,530
Administration benefits expense	585,000	600,278	658,505	722,380	792,451	869,319	953,643	1,046,146	1,147,623	1,258,942
Building rental expense	3,000,000	3,300,000	3,630,000	3,993,000	4,392,300	4,831,530	5,314,683	5,846,151	6,430,766	7,073,843
Utilities	373,714	415,897	462,652	514,461	571,856	635,423	705,808	783,726	869,962	948,578
Fuel Cost	181,986	222,783	261,213	305,457	356,335	414,777	481,841	558,725	646,786	720,407
License,Permits,etc.	80,000	88,053	96,917	106,674	117,412	129,232	142,241	156,560	172,320	189,667
Communications expense (phone,mail, internet, etc.)	396,000	434,412	476,550	522,775	573,485	629,113	690,136	757,080	830,516	911,076
Office vehicles running expense	332,640	364,906	400,302	439,131	481,727	528,455	579,715	635,947	697,634	765,304
Office expenses (stationery, entertainment etc.)	396,000	434,412	476,550	522,775	573,485	629,113	690,136	757,080	830,516	911,076
Promotional expense	545,959	668,350	783,640	916,371	1,069,004	1,244,332	1,445,524	1,676,174	1,940,357	2,161,220
Depreciation expense	2,702,436	2,702,436	2,702,436	2,702,436	2,702,436	2,702,436	1,819,871	5,055,141	5,055,141	5,055,141
Amortization of pre-operating costs	44,469	44,469	44,469	44,469	44,469	-	-	-	-	-
Subtotal	16,558,204	17,964,236	19,524,234	21,245,436	23,144,650	25,195,979	26,626,328	32,414,323	35,231,950	38,216,784
Operating Income	6,207,198	11,729,195	15,848,462	20,712,296	26,435,797	33,194,910	41,933,316	47,866,205	58,541,681	66,575,783
Gain / (loss) on sale of machinery & equipment	-	-	-	-	-	-	3,662,000	-	-	-
Gain / (loss) on sale of office equipment	-	-	-	-	-	-	356,250	-	-	-
Gain / (loss) on sale of office vehicles	-	-	-	-	-	-	83,325	-	-	-
Earnings Before Interest & Taxes	6,207,198	11,729,195	15,848,462	20,712,296	26,435,797	33,194,910	46,034,891	47,866,205	58,541,681	66,575,783
Subtotal	-	-	-	-	-	-	-	-	-	-
Earnings Before Tax	6,207,198	11,729,195	15,848,462	20,712,296	26,435,797	33,194,910	46,034,891	47,866,205	58,541,681	66,575,783
Tax	1,292,519	3,225,218	4,666,962	6,369,304	8,372,529	10,738,218	15,232,212	15,873,172	19,609,588	22,421,524
NET PROFIT/(LOSS) AFTER TAX	4,914,678	8,503,977	11,181,500	14,342,992	18,063,268	22,456,691	30,802,679	31,993,034	38,932,093	44,154,259

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	2,000,000	4,431,628	7,786,284	11,621,730	15,740,554	20,163,997	24,898,009	30,580,365	65,273,399	106,576,390	160,138,351
Accounts receivable	-	5,459,589	6,683,495	7,836,397	9,163,710	10,690,042	12,443,323	14,455,243	16,761,743	19,403,574	16,855,796
Equipment spare part inventory	97,653	117,766	142,022	171,273	206,549	249,091	300,395	362,265	436,879	526,860	-
Raw material inventory-White Vinegar	60,581	83,922	110,947	145,648	190,064	246,752	318,917	410,568	526,719	639,584	-
Finished goods inventory-White Vinegar		168,778	204,345	245,362	292,567	346,790	408,964	480,142	561,506	654,386	720,261
Finished goods inventory- Apple Cider		132,216	145,525	160,175	176,299	194,047	213,581	235,081	258,746	284,793	313,462
Total Current Assets	2,158,234	10,668,898	15,375,118	20,513,335	26,135,769	32,293,347	39,026,079	47,010,843	84,354,890	128,675,073	178,027,870
<i>Fixed assets</i>											
Land	-	-	-	-	-	-	-	-	-	-	-
Building Renovation	547,409	492,668	437,927	383,186	328,445	273,705	218,964	164,223	109,482	54,741	-
Machinery & equipment	14,648,000	12,450,800	10,253,600	8,056,400	5,859,200	3,662,000	1,464,800	27,766,905	23,601,869	19,436,834	15,271,798
Furniture & fixtures	1,245,000	1,058,250	871,500	684,750	498,000	311,250	124,500	2,360,035	2,006,030	1,652,025	1,298,019
Office vehicles	333,300	283,305	233,310	183,315	133,320	83,325	33,330	507,817	431,644	355,472	279,299
Office equipment	1,425,000	1,211,250	997,500	783,750	570,000	356,250	142,500	2,701,245	2,296,058	1,890,872	1,485,685
Security against building	18,948,709	16,246,273	13,543,837	10,841,401	8,138,965	5,436,530	2,734,094	34,250,225	29,195,084	24,139,943	19,084,801
<i>Intangible assets</i>											
Pre-operation costs	222,345	177,876	133,407	88,938	44,469	-	-	-	-	-	-
Total Intangible Assets	222,345	177,876	133,407	88,938	44,469	-	-	-	-	-	-
TOTAL ASSETS	21,329,289	27,093,048	29,052,362	31,443,674	34,319,204	37,729,876	41,760,172	81,261,068	113,549,974	152,815,015	197,112,671
Liabilities & Shareholders' Equity											
<i>Current liabilities</i>											
Accounts payable		849,081	1,013,746	1,168,972	1,345,712	1,546,852	1,775,670	2,035,894	2,331,766	2,664,715	2,808,111
Total Current Liabilities	-	849,081	1,013,746	1,168,972	1,345,712	1,546,852	1,775,670	2,035,894	2,331,766	2,664,715	2,808,111
<i>Other liabilities</i>											
Total Long Term Liabilities	-	-	-	-	-	-	-	-	-	-	-
<i>Shareholders' equity</i>											
Paid-up capital	21,329,289	21,329,289	21,329,289	21,329,289	21,329,289	21,329,289	21,329,289	29,767,282	29,767,282	29,767,282	29,767,282
Retained earnings		4,914,678	6,709,328	8,945,414	11,644,203	14,853,736	18,655,214	49,457,893	81,450,926	120,383,019	164,537,278
Total Equity	21,329,289	26,243,967	28,038,616	30,274,703	32,973,492	36,183,025	39,984,502	79,225,175	111,218,208	150,150,301	194,304,560
TOTAL CAPITAL AND LIABILITIES	21,329,289	27,093,048	29,052,362	31,443,674	34,319,204	37,729,876	41,760,172	81,261,068	113,549,974	152,815,015	197,112,671

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		4,914,678	8,503,977	11,181,500	14,342,992	18,063,268	22,456,691	30,802,679	31,993,034	38,932,093	44,154,259
Add: depreciation expense		2,702,436	2,702,436	2,702,436	2,702,436	2,702,436	2,702,436	1,819,871	5,055,141	5,055,141	5,055,141
Amortization of pre-operating costs		44,469	44,469	44,469	44,469	44,469	-	-	-	-	-
Accounts receivable		(5,459,589)	(1,223,906)	(1,152,901)	(1,327,314)	(1,526,332)	(1,753,281)	(2,011,920)	(2,306,501)	(2,641,830)	2,547,778
Equipment Spare Parts inventory	(97,653)	(20,113)	(24,256)	(29,251)	(35,276)	(42,542)	(51,304)	(61,870)	(74,614)	(89,981)	526,860
Raw Material Inventory-White Vinegar	(60,581)	(23,341)	(27,025)	(34,701)	(44,416)	(56,688)	(72,164)	(91,651)	(116,152)	(112,864)	639,584
Finished Goods Inventory-White Vinegar		(168,778)	(35,567)	(41,018)	(47,205)	(54,222)	(62,174)	(71,178)	(81,364)	(92,880)	(65,875)
Finished Goods Inventory-Apple Cider		(132,216)	(13,310)	(14,650)	(16,124)	(17,747)	(19,534)	(21,500)	(23,665)	(26,047)	(28,669)
Pre-paid building rent	-	(275,000)	(27,500)	(30,250)	(33,275)	(36,603)	(40,263)	(44,289)	(48,718)	(53,590)	589,487
Accounts payable		849,081	164,665	155,226	176,740	201,140	228,818	260,224	295,872	332,949	143,397
Cash provided by operations	(158,234)	2,431,628	10,063,984	12,780,860	15,763,027	19,277,179	23,389,225	30,580,365	34,693,034	41,302,990	53,561,961
<i>Financing activities</i>											
Issuance of shares	21,329,289	-	-	-	-	-	-	8,437,993	-	-	-
Cash provided by / (used for) financing activities	21,329,289	-	-	-	-	-	-	8,437,993	-	-	-
<i>Investing activities</i>											
Capital expenditure	(19,171,054)	-	-	-	-	-	-	(33,336,002)	-	-	-
Cash (used for) / provided by investing activities	(19,171,054)	-	-	-	-	-	-	(33,336,002)	-	-	-
NET CASH	2,000,000	2,431,628	10,063,984	12,780,860	15,763,027	19,277,179	23,389,225	5,682,356	34,693,034	41,302,990	53,561,961

13. KEY ASSUMPTIONS

13.1. Operating Cost Assumptions

Table 40: Operating Cost Assumptions

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

13.2. Revenue Assumptions

Table 41: Revenue Assumptions-White Vinegar

Description	Details
Sale price growth rate	11.2%
Initial capacity utilization	50%
Capacity growth rate	5%
Maximum capacity utilization	90%

Table 42: Revenue Assumptions-Apple Cider

Description	Details
Sale price growth rate	11.2%
Initial capacity utilization	50%
Capacity growth rate	5%
Maximum capacity utilization	90%

13.3. Financial Assumptions

Table 43: Financial Assumptions

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

13.4. Debt Related Assumptions

Table 44: Debt Related Assumption

Description of Cost	Details
Project Life (Years)	10
Debt: Equity	50:50
Discount Rate	13%
Debt Tenure	5 years
Grace Period	1 Year
Interest Rate (KIBOR+3%)	11.3%

13.5. Cash Flow Assumptions

Table 45: Cash Flow Assumptions

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

Small and Medium Enterprises Development Authority

HEAD OFFICE

4th Floor, Building No. 3, Aiwan-e-Iqbal Complex, Egerton Road, Lahore
Tel: (92 42) 111 111 456, Fax: (92 42) 36304926-7

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

REGIONAL OFFICE PUNJAB	REGIONAL OFFICE SINDH	REGIONAL OFFICE KPK	REGIONAL OFFICE BALOCHISTAN
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