**Detailed Project Report**

**Chocolate coated Pomegranate Manufacturing Unit**

**Under the Formalization of Micro Food Processing Enterprises Scheme**

**(Ministry of Food Processing Industries, Government of India)**

## Prepared By


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# The Project at a Glance

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| 2 | Name of the entrepreneur/FPO/SHG/Cooperative | |
| 3 | Nature of proposed project | Proprietorship/Company/ Partnership |
| 4 | Registered office | |
| 5 | Project site/location | |
| 6 | Names of Partner (if partnership) | |
| 7 | No of share-holders (if company/FPC) | |
| 8 | Technical advisor | |
| 9 | Marketing advisor/partners | |
| 10 | Proposed project capacity | 150 MT/annum (70, 80 & 90% capacity utilization in the 2nd, 3rd and 4th years' onwards respectively |
| 11 | Raw materials | Pomegranate Fruit |
| 12 | Major product outputs | Chocolate coated Pomegranate |
| 13 | Total project cost (Lakhs) | 20.07 |
| | Land development, building & civil construction | 4.44 |
| | Machinery and equipments | 10.38 |
| | Utilities (Power & water facilities) | 2.2 |
| | Miscellaneous fixed assets | 0.9 |
| | Pre-operative expenses | 0.90 |
| | Contingencies | 1.00 |
| | Working capital margin | 0.25 |
| 14 | Working capital Management (In Lakhs) | |
| | Second Year | 26.17 |
| | Third Year | 29.91 |
| | Fourth Year | 38.46 |
| 15 | Means of Finance | |
| | Subsidy grant by MoFPI (max 10 lakhs) | 6.6231 |
| | Promoter's contribution (min 20%) | 4.014 |
| | Term loan (45%) | 9.4329 |
| 16 | Debt-equity ratio | 2.35: 1 |
| 17 | Profit after Depreciation, Interest & Tax | |
| | 2nd year | 133.24 |
| | 3rd year | 148.22 |
| | 4th year | 168.33 |
| 18 | Average DSCR | 23.44 |
| | Benefit Cost Ratio | 2.718350144 |
| | Term Loan Payment | 7 Years with 1 year grace period |
| | Pay Back Period for investment | Less than 2 Years |

## Background

The pomegranate (Punica granatum) is a fruit-bearing deciduous shrub in the family Lythraceae, subfamily Punicoideae, that grows between 5 and 10 m (16 and 33 ft) tall.

The pomegranate originated in the region extending from Iran to northern India and has been cultivated since ancient times throughout the Mediterranean region. It was introduced into Spanish America in the late 16th century and into California by Spanish settlers in 1769.

The fruit is typically in season in the Northern Hemisphere from October to February, and in the Southern Hemisphere from March to May. As intact sarcotestas or juice, pomegranates are used in baking, cooking, juice blends, meal garnishes, smoothies, and alcoholic beverages, such as cocktails and wine.

Today, it is widely cultivated throughout the Middle East and Caucasus region, north and tropical Africa, the Indian subcontinent, Central Asia, the drier parts of Southeast Asia, and parts of the Mediterranean Basin. It is also cultivated in parts of Arizona and the San Joaquin Valley in California. In the 20th and 21st centuries, it has become more common in the shops and markets of Europe and the Western Hemisphere.

## Cultivation

P. granatum is grown for its fruit crop, and as ornamental trees and shrubs in parks and gardens. Mature specimens can develop sculptural twisted-bark multiple trunks and a distinctive overall form. Pomegranates are drought-tolerant, and can be grown in dry areas with either a Mediterranean winter rainfall climate or in summer rainfall climates. In wetter areas, they can be prone to root decay from fungal diseases. They can be tolerant of moderate frost, down to about −12 °C (10 °F).

Insect pests of the pomegranate can include the pomegranate butterfly Virachola isocrates and the leaf-footed bug Leptoglossus zonatus, and fruit flies and ants are attracted to unharvested ripe fruit.[18] Pomegranate grows easily from seed, but is commonly propagated from 25 to 50 cm (10 to 20 in) hardwood cuttings to avoid the

genetic variation of seedlings. Air layering is also an option for propagation, but grafting fails.

After the pomegranate is opened by scoring it with a knife and breaking it open, the seeds are separated from the peel and from the internal pulp membranes. Separating the seeds is easier in a bowl of water because the seeds sink and the inedible pulp floats. Freezing the entire fruit also makes it easier to separate. Another effective way of quickly harvesting the seeds is to cut the pomegranate in half, score each half of the exterior rind four to six times, hold the pomegranate half over a bowl, and smack the rind with a large spoon. The seeds should eject from the pomegranate directly into the bowl, leaving only a dozen or more deeply embedded seeds to remove.

Pomegranate juice can be sweet or sour, but most fruits are moderate in taste, with sour notes from the acidic ellagitannins contained in the juice. Pomegranate juice has long been a popular drink in Europe and the Middle East, and is now widely distributed in the United States and Canada.

Grenadine syrup originally consisted of thickened and sweetened pomegranate juice, now is usually a sales name for a syrup based on various berries, citric acid, and food coloring, mainly used in cocktail mixing.

Before tomatoes (a New World fruit) arrived in the Middle East, pomegranate juice, molasses, and vinegar were widely used in many Iranian foods, and are still found in traditional recipes such as fesenjan, a thick sauce made from pomegranate juice and ground walnuts, usually spooned over duck or other poultry and rice, and in ash-e anar (pomegranate soup).

Pomegranate seeds are used as a spice known as anar dana (from Persian: anar + dana, pomegranate + seed), most notably in Indian and Pakistani cuisine. Dried whole seeds can often be obtained in ethnic Indian markets. These seeds are separated from the flesh, dried for 10–15 days, and used as an acidic agent for chutney and curry preparation. Ground anardana is also used, which results in a deeper flavoring in dishes and prevents the seeds from getting stuck in teeth. Seeds of the wild pomegranate

variety known as daru from the Himalayas are regarded as high-quality sources for this spice.

Dried pomegranate seeds, found in some natural specialty food markets, still contain some residual water, maintaining a natural sweet and tart flavor. Dried seeds can be used in several culinary applications, such as trail mix, granola bars, or as a topping for salad, yogurt, or ice cream.

In the Caucasus, pomegranate is used mainly for juice. In Azerbaijan, a sauce from pomegranate juice narsharab, (from Persian: (a)nar + sharab, lit. "pomegranate wine") is usually served with fish or tika kabab.

In Turkey, pomegranate sauce (Turkish: nar ekşisi) is used as a salad dressing, to marinate meat, or simply to drink straight. Pomegranate seeds are also used in salads and sometimes as garnish for desserts such as güllaç. Pomegranate syrup or molasses is used in muhammara, a roasted red pepper, walnut, and garlic spread popular in Syria and Turkey.

In Greece, pomegranate is used in many recipes, including kollivozoumi, a creamy broth made from boiled wheat, pomegranates, and raisins, legume salad with wheat and pomegranate, traditional Middle Eastern lamb kebabs with pomegranate glaze, pomegranate eggplant relish, and avocado-pomegranate dip. Pomegranate is also made into a liqueur, and as a popular fruit confectionery used as ice cream topping, mixed with yogurt, or spread as jam on toast.

In Mexico, they are commonly used to adorn the traditional dish chiles en nogada, representing the red of the Mexican flag in the dish which evokes the green (poblano pepper), white (nogada sauce) and red (pomegranate seeds) tricolor.

## Nutrition

## Pomegranates

Nutritional value per 100 g (3.5 oz)

| | |
|---|---|
| Energy | 346 kJ (83 kcal) |
| | |
| Carbohydrates | 18.7 g |
| Sugars | 13.67 g |
| Dietary fiber | 4 g |
| Fat | 1.17 g |
| Protein | 1.67 g |
| | |
| **Vitamins** | **Quantity %DV†** |
| | |
| Thiamine (B1) | 6%0.067 mg |
| Riboflavin (B2) | 4%0.053 mg |
| Pantothenic acid(B5) | 8%0.377 mg |
| Vitamin B6 | 6%0.075 mg |
| Folate (B9) | 10%38 µg |
| Choline | 2%7.6 mg |
| Vitamin C | 12%10.2 mg |
| Vitamin E | 4%0.6 mg |
| Vitamin K | 16%16.4 µg |
| | |
| **Minerals** | **Quantity %DV†** |
| | |
| Calcium | 1%10 mg |
| Iron | 2%0.3 mg |
| Magnesium | 3%12 mg |
| Manganese | 6%0.119 mg |
| Phosphorus | 5%36 mg |
| Potassium | 5%236 mg |
| Sodium | 0%3 mg |
| Zinc | 4%0.35 mg |

Units

µg = micrograms • mg = milligrams IU = International units

†Percentages are roughly approximated using US recommendations for adults.

Source: USDA Nutrient Database

**A 100 g (3.5 oz) serving of pomegranate provides 12% of the Daily Value (DV) for vitamin C, 16% DV for vitamin K, and 10% DV for folate.**

Pomegranate seeds are a rich source of dietary fiber (20% DV) which is entirely contained in the edible seeds.

Phytochemicals

The most abundant phytochemicals in pomegranate juice are polyphenols, including the hydrolyzable tannins called ellagitannins formed when ellagic acid and gallic acid bind with a carbohydrate to form pomegranate ellagitannins, also known as punicalagins. The red color of the juice is attributed to anthocyanins, such as delphinidin, cyanidin, and pelargonidin glycosides. Generally, an increase in juice pigmentation occurs during fruit ripening. The phenolic content of pomegranate juice is degraded by processing and pasteurization techniques.

Pomegranate peel contains high amounts of polyphenols, condensed tannins, catechins, and prodelphinidins. The higher phenolic content of the peel yields extracts for use in dietary supplements and food preservatives.

Pomegranate seed oil contains punicic acid (65%), palmitic acid (5%), stearic acid (2%), oleic acid (6%), and linoleic acid (7%).

Major health benefits are listed below.

1. Protects us from free radicals

Pomegranate is rich in anti-oxidants and thus protects our body from free radicals, which are responsible for premature ageing. Free radicals are formed by exposure to sun and due to harmful toxins in the environment.

2. It thins your blood

Antioxidants present in pomegranate act as a ‘thinner for your blood’. The seeds of pomegranate prevent your blood platelets from forming clots and coagulating.

There are two types of blood clots, first is the good one which speeds the recovery during a cut or an injury and second is when there is any internal clot, like in heart, arteries or anywhere else inside the body. These type of clots are not good and can be fatal.

3. Prevention of atherosclerosis

With increasing age and the type of lifestyle we live, the walls of our arteries become harder due to cholesterol, resulting in blockages sometimes. The anti-oxidant property of pomegranate prevents bad cholesterol from oxidizing. So, eating pomegranates removes the excess fat and prevents the hardening of artery walls.

4. It acts like an oxygen mask

Pomegranate helps to pump the level of oxygen in our blood. Due to anti-oxidants present in pomegranate, it fights free radicals, reduces cholesterol and prevents blood clot. All this eventually helps blood to flow freely and thus improve the level of oxygen in your body.

5. It prevents arthritis

Pomegranate can reduce the damage of the cartilage by fighting the enzyme that does so. Pomegranate also has the ability to reduce inflammation.

6. Fights erectile dysfunction

Though it is not a wonder drug but yes pomegranate juice can slightly improve erectile dysfunction. And a lot of theories prove this as true.

7. Fights heart disease and prostate cancer

Two studies claim that pomegranate juice has the ability to fight prostate cancer. An experiment showed that pomegranate juice slowed the growth and even killed cultured cancer cells. And as we have already mentioned in the second point, pomegranate juice thins the blood and thus improves its condition which in turn prevents cardiovascular diseases.

8. Pomegranate is loaded with beneficial nutrients

A cup of pomegranate seed contains 24 grams of sugar and 144 calories. A cup of pomegranate seeds contain following nutrients:

Fiber: 7 grams

Protein: 3 grams

Folate: 16 per cent of the RDA

Potassium: 12 per cent of the RDA

Vitamin C: 30 per cent of the RDA

Vitamin K: 36 per cent of the RDA

9. It improves memory

A study was conducted where people who had a problem with their memory were given 237ml of pomegranate juice every day. After a certain period of time, a lot of improvement was seen in their verbal and visual memory. In fact, another experiment done on mice shows that pomegranate consumption can also prevent Alzheimer's. But the experiment is yet to be done on humans.

10. It lowers blood pressure

Punicic acid is one of the main constituents of pomegranate that help lower cholesterol, triglycerides and reduce blood pressure.

11. Helps in digestion

We all know fibre is good for digestion. But due to our lifestyle where we are inclined towards eating junk food, we miss the goodness of fibre in our vegetables and fruits. Adding pomegranate to your everyday diet can be one the best ways to include fibre in

your daily routine. One pomegranate contains 45 per cent of your daily recommended intake of fibre.

12. Boosts immunity

Being rich in anti-inflammatory compounds, pomegranates are extremely healthy for those suffering from immune-related disorders like rheumatoid arthritis and osteroarthrits. They are also rich in vitamin C, which boosts antibody production and helps in the development of immunity. Pomegranates can thus help you maintain a healthy immune system and keep common illnesses and infections at bay.

13. Lowers stress levels

Apart from reducing body's internal oxidative stress, pomegranates also help lower psychological stress that you go through in your personal and professional life. According to a study conducted by Queen Margaret University, people who drank pomegranate juice had lower levels of cortisol, a stress hormone that is increased under stressful situations.

14. Prevent plaque formation

You use mouth wash to improve your oral health, but much to your surprise pomegranate juice can be a better option than alcohol containing mouth washes. Certain compounds in pomegranate exhibit strong antiplaque effects.

A study showed that hydroalcoholic extract of pomegranate effectively lowered dental plaque formation due to microorganisms build up by almost 84 per cent.

15. Strengthen bones and athletic performance

Several studies conducted over the years have testified that regularly eating pomegranates could be excellent for your bone health. Animal studies have also shown that the fruit could have a preventive effect on bone loss. High flavonols present in the fruit actively help fight any inflammation which could cause problems like cartilage damage and osteoarthritis. There are growing researches being done to study its effect

on reducing problems like rheumatoid arthritis, osteoporosis and other joint problems. In fact, the antioxidant content found in pomegranate juice also benefits athletic performance. Runners are actively encouraged to consume the fruit as well since it could potentially enhance performance, aerobic activity and build endurance.

16. A natural fertility booster

There's another hidden benefit to the red fruit. Pomegranates, with its rich antioxidant content, has been found to lower oxidative stress levels in the body. Oxidative stress has been linked to sperm dysfunction as well as decreased fertility in women. Studies are underway to understand other potent benefits it may carry for the reproductive system.

## Food Safety Concerns

**When taken by mouth:** Pomegranate juice is LIKELY SAFE for most people when taken by mouth. Most people do not experience side effects. Some people can have allergic reactions to pomegranate fruit. Pomegranate extract is POSSIBLY SAFE when taken by mouth or applied to the skin.

**The root, stem, or peel of pomegranate is POSSIBLY UNSAFE** when taken by mouth in large amounts. **The root, stem, and peel contain poisons.**

**When applied to the skin:** Pomegranate extract is POSSIBLY SAFE when applied to the skin. Some people have experienced sensitivity to pomegranate extract. Symptoms of sensitivity include itching, swelling, runny nose, and difficulty breathing.

Special Precautions & Warnings:

**Pregnancy and breast-feeding:** Pomegranate juice is POSSIBLY SAFE for pregnant and breast-feeding women. But there is not enough reliable information about the safety of using other forms of pomegranate, such as pomegranate extract. If you use pomegranate during pregnancy or breast-feeding, stick with the juice.

**Low blood pressure:** Drinking pomegranate juice can slightly lower blood pressure. Drinking pomegranate juice might increase the risk of blood pressure dropping too low in people who already have low blood pressure.

**Allergies to plants:** People with plant allergies seem to be more likely to have an allergic reaction to pomegranate.

**Surgery:** Pomegranate might affect blood pressure. This might interfere with blood pressure control during and after surgery. Stop taking pomegranate at least 2 weeks before a scheduled surgery.

People who are allergic to pomegranate may experience itching, swelling, runny nose, and difficulty breathing. Also, the root, stem, and peel of the pomegranate are possibly unsafe when consumed in large amounts.

Also, there is concern in the medical community about drug interactions in people who consume pomegranate juice. Based on the limited evidence about the potential drug interactions, it is essential that you talk with your doctor if you are taking medication and are considering drinking pomegranate juice.

Common food safety issues being faced while handling this product are mentioned below.

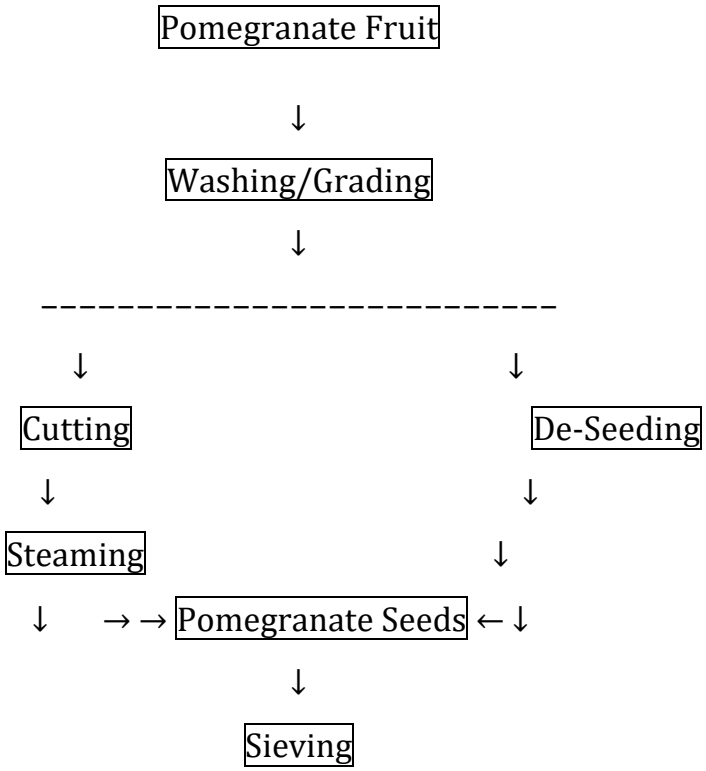
1. Fungal Growth
2. Other microbial (Pathogen) related issues.

Solutions to overcome the aforesaid issues.

1. A). Suitable preservative addition in prescribed limit will retard the fungal growth.
   B). Chocolate quality is also an important factor to be taken care of. As thin chocolate syrup will lead to increase in water activity and thus fungal growth will be there, and much more thickness will create the difficulty while coating.
   C). Rotten and Overripe fruit removal is essential for micro-organisms elimination and for good taste and Flavour profile.
2. A). Cleaning with suitable disinfectant ($ClO_2$) with suitable concentration (10-100 ppm) will almost eliminate all the microbes present, and chlorine itself will be evaporated in gaseous form after killing the bacteria, and traces will not be there at the end.
   B). A treatment with ionizing radiation at doses up to 1 KGy is sufficient for fruits and vegetables. It is generally applied to inhibit post-harvest pathogens and to protect product quality. Irradiation may be effective for eliminating pathogenic microorganisms from surfaces of product. An irradiation of 1 KGy has been reported effective for the destruction of listeria monocytogens.

Proper Plant hygiene, machinery and personal hygiene is the most important to achieve the desired quality till full shelf life.

The **typical Flow diagram** for Pomegranate processing is as below




During traditional Pasteurization methods some nutrient loss is observed hence we need a process where such extensive heat treatments are minimized there by preserving the original nutritional value of the pomegranate. Hence, we have proposed production of Choco Pomegranate pots. The process involves careful selection of ingredients. Initially we will select the best quality of pomegranates and best quality of dark chocolates (slightly sweetened).

The typical Procedure for manufacturing of Chocolate coated Pomegranate is as below:

Selection of Pomegranates
↓
*Sorting and Grading of Pomegranates
↓
Washing of Pomegranates (water with $ClO_2$ tablet)
↓
De seeding
↓
Seed Collection
↓
*Blanching the seeds into Luke warm water added with $ClO_2$ Tablet ($45^0$ C)
↓
Air drying the seeds
↓
*Melting Dark Chocolates in Chocolate melting Tank
↓
Passing of Pomegranate seeds through Melted Chocolate
↓
Passing through mesh conveyor
↓
*Freezing (Till Complete solidification)
↓
Packing into Pouch (weight basis) and Storage* ($0^0$C to $4^0$C) till dispatch

Note: * indicates Critical Control Points.

As mentioned in the flow diagram, if critical control points are not taken into consideration, there are chances of adverse impacts on the quality of the foods manufactured and they may depend on the type and concentration of hazards.

The Dark chocolates has its own set of **health benefits** which are as under:

Dark chocolate is loaded with nutrients that can positively affect your health.

Made from the seed of the cocoa tree, it is one of the best sources of antioxidants on the planet.

Studies show that dark chocolate (not the sugary crap) can improve your health and lower the risk of heart disease.

1. Very Nutritious

If you buy quality dark chocolate with a high cocoa content, then it is actually quite nutritious.

It contains a decent amount of soluble fiber and is loaded with minerals.

A 100-gram bar of dark chocolate with 70–85% cocoa contains (1):

- 11 grams of fiber
- 67% of the RDI for iron
- 58% of the RDI for magnesium
- 89% of the RDI for copper
- 98% of the RDI for manganese

It also has plenty of potassium, phosphorus, zinc and selenium

The fatty acid profile of cocoa and dark chocolate is also excellent. The fats are mostly saturated and monounsaturated, with small amounts of polyunsaturated fat.

It also contains stimulants like caffeine and theobromine, but is unlikely to keep you awake at night as the amount of caffeine is very small compared to coffee.

**Powerful Source of Antioxidants**

ORAC stands for “oxygen radical absorbance capacity.” It is a measure of the antioxidant activity of foods.

Basically, researchers set a bunch of free radicals (bad) against a sample of a food and see how well the antioxidants in the food can "disarm" the radicals.

The biological relevance of ORAC values is questioned, because it's measured in a test tube and may not have the same effect in the body.

However, it is worth mentioning that raw, unprocessed cocoa beans are among the highest-scoring foods that have been tested.

Dark chocolate is loaded with organic compounds that are biologically active and function as antioxidants. These include polyphenols, flavanols and catechins, among others.

One study showed that cocoa and dark chocolate had more antioxidant activity, polyphenols and flavanols than any other fruits tested, which included blueberries and acai berries.

**May Improve Blood Flow and Lower Blood Pressure**

The flavanols in dark chocolate can stimulate the endothelium, the lining of arteries, to produce nitric oxide (NO).

One of the functions of NO is to send signals to the arteries to relax, which lowers the resistance to blood flow and therefore reduces blood pressure.

Many controlled studies show that cocoa and dark chocolate can improve blood flow and lower blood pressure, though the effects are usually mild

**Raises HDL and Protects LDL From Oxidation**

Consuming dark chocolate can improve several important risk factors for heart disease.

In a controlled study, cocoa powder was found to significantly decrease oxidized LDL cholesterol in men. It also increased HDL and lowered total LDL for those with high cholesterol

Oxidized LDL means that the LDL ("bad" cholesterol) has reacted with free radicals.

This makes the LDL particle itself reactive and capable of damaging other tissues, such as the lining of the arteries in your heart.

It makes perfect sense that cocoa lowers oxidized LDL. It contains an abundance of powerful antioxidants that do make it into the bloodstream and protect lipoproteins against oxidative damage.

Dark chocolate can also reduce insulin resistance, which is another common risk factor for many diseases like heart disease and diabetes

**May Reduce Heart Disease Risk**

The compounds in dark chocolate appear to be highly protective against the oxidation of LDL.

In the long term, this should cause much less cholesterol to lodge in the arteries, resulting in a lower risk of heart disease

In fact, several long-term observational studies show a fairly drastic improvement.

In a study of 470 elderly men, cocoa was found to reduce the risk of death from heart disease by a whopping 50% over a 15-year period.

Another study revealed that eating chocolate two or more times per week lowered the risk of having calcified plaque in the arteries by 32%. Eating chocolate less frequently had no effect.

Yet another study showed that eating dark chocolate more than 5 times per week lowered the risk of heart disease by 57%.

Of course, these three studies are observational studies, so can't prove that it was the chocolate that reduced the risk.

However, since the biological process is known (lower blood pressure and oxidized LDL), it is plausible that regularly eating dark chocolate may reduce the risk of heart disease.

May Protect Your Skin from the Sun

The bioactive compounds in dark chocolate may also be great for your skin.

The flavanols can protect against sun damage, improve blood flow to the skin and increase skin density and hydration.

The minimal erythemal dose (MED) is the minimum amount of UVB rays required to cause redness in the skin 24 hours after exposure.

In one study of 30 people, the MED more than doubled after consuming dark chocolate high in flavanols for 12 weeks.

If you're planning a beach vacation, consider loading up on dark chocolate in the prior weeks and months.

**Could Improve Brain Function**

The good news isn't over yet. Dark chocolate may also improve the function of your brain.

One study of healthy volunteers showed that eating high-flavanol cocoa for five days improved blood flow to the brain.

Cocoa may also significantly improve cognitive function in elderly people with mental impairment. It may improve verbal fluency and several risk factors for disease, as well.

Additionally, cocoa contains stimulant substances like caffeine and theobromine, which may be a key reason why it can improve brain function in the short term.

There is considerable evidence that cocoa can provide powerful health benefits, being especially protective against heart disease.

Dark chocolates typically contain some sugar, but the amounts are usually small and the darker the chocolate, the less sugar it will contain.

Chocolate is one of the few foods that taste awesome while providing significant health benefits.

## Pomegranate Processing

Ongoing global drive for a healthier diet has led to a rise in demand for convenient and fresh food produce, with high nutritional value and free of additives. Pomegranate indicates the great scope for the processing into value added products having extended shelf life. The fruit disorders such as sun burnt husks, splits and cracks and husk scald on whole fruit reduces marketability and consumer acceptance. The new sector of pomegranate processing allows the use of the fruits with low quality fruits that cannot be commercialized, for the preparation of the new products. Despite of great potential for pomegranate derived products, the industrial processing of pomegranate is scarce due to peeling difficulties and lack of technological development for industrial processing of pomegranate. The activity of research and development on pomegranate has aimed at the application of new refrigerated technologies to extend the commercial shelf life of pomegranate to cash the market for export of fresh pomegranates keeping its original quality and at the search of new pomegranate derived products. The pomegranate can be processed into products like minimally processed fresh arils, juice, squash, beverage, molasses, juice concentrates, frozen seeds, jam, jelly, marmalades, grenadine, wine, seeds in syrup, pomegranate spirits, pomegranate powder, pomegranate rind powder, anardana, confectionery, pomegranate seed oil etc.

Preservation Techniques

The pomegranate is classified as a non-climacteric fruit. In spite of the non climacteric nature of the fruit, quantitative and qualitative loss still occur due to postharvest handling processes, resulting in chilling injuries, husk scalding, weight loss and decay of pomegranate.

### Physical treatments

The new physical treatment applications have been reported to prolong the shelf life of the fresh pomegranates. These treatments modifies the environmental conditions of pomegranate storage, effecting the fruit physiology and biochemistry and

inhibiting the development of micro-organisms contaminating the fruit surface, keeping the original physico-chemical quality of the fruit.

**Refrigeration**

Kader, et al. and Artes recommended a fast pre-refrigeration using forced air as one of the simplest ways to extend the commercial life of pomegranate up to 2-3 months by keeping storage temperature around 5°C.

**MAP**

Artes and Tomas Barberan reported the applications of controlled and modified atmospheres ($CO_2$ enriched and/or reduced $O_2$), use of the thermal treatments for fruit conditioning and curing and intermittent warming during the cold storage to avoid fungal developments and physiological disorders that develops below 5°C. Active MAP involves a quick process of gas flushing or gas replacement or the use of gas-scavenging agents to establish a desired gas mixture within the package. Studies have shown that modified atmosphere packaging (MAP) and controlled atmosphere storage (CAS) have the ability to delay quality loses and thus extends the shelf life of fresh or minimally processed or fresh-cut produce Modified atmosphere packaging can result in reduction in the respiratory activity by decreasing $O_2$ concentration, delay in softening and ripening and a reduced incidence of the various physiological disorders and pathogenic infestations.

MAP sensing and Monitoring: 'Smart' or 'active' or 'intelligent' packaging system is introduced to improve the safety of MAP products and to extend the technology to a broader spectrum of products. Summers defined the Smart packaging as an interaction between the packing system and the product itself which confers intelligence appropriate to function and use of the product with the ability to sense or to be sensed and to communicate. Nano biosensors can serve as the best smart packaging tool for MAP sensing and monitoring. Artes, et al. recommended a controlled atmosphere of 5% $O_2$ + 0% to 5% $CO_2$ composition for the storage of Mollar pomegranate at 5° C with RH 95% to minimize decay weight loss and chilling injuries. In contrast, Kader recommended a gas composition of 3% to 5%$O_2$ + 5% to 10% $CO_2$ for storage of pomegranate at 5° C. Studied also reported the chilling injuries to pomegranates when stored at temperatures lower than 5° C.

## Packaging of Chocolate Coated Pomegranate

Common spoilage issues being faced while handling this product are mentioned below.

3. Fungal Growth
4. Other microbial (Pathogen) related issues.
5. Maintaining Storage Temperature of the product

Solutions to overcome the aforesaid issues.

3. A). Suitable preservative addition in prescribed limit will retard the fungal growth.
   B). Chocolate quality is also an important factor to be taken care of. As thin chocolate syrup will lead to increase in water activity and thus fungal growth will be there, and much more thickness will create the difficulty while coating.
   C). Rotten and Overripe fruit removal is essential for microbes elimination and for good taste and Flavor profile.
4. A). Cleaning with suitable disinfectant ($ClO_2$) with suitable concentration (10-100 ppm) will almost eliminate all the microbes present, and chlorine itself will be evaporated in gaseous form after killing the bacteria, and traces will not be there at the end.
   B). A treatment with ionizing radiation at doses up to 1 KGy is sufficient for fruits and vegetables. It is generally applied to inhibit post-harvest pathogens and to protect product quality. Irradiation may be effective for eliminating pathogenic microorganisms from surfaces of product. An irradiation of 1 KGy has been reported effective for the destruction of listeria monocytogens.

Proper Plant hygiene, machinery and personal hygiene is the most important to achieve the desired quality till full shelf life.

## Packaging Employed for Such Products

### Glass:

Chemically inert and will not affect the quality, odour or taste of the product. It is Strong, rigid and 100% recyclable.

### PET (Poly Ethylene terephthalate)

Light weight, flexible and recyclable.

It is considered to be the backbone of packaging films. Since one of the greatest threats to the integrity of coated products comes from moisture, polyethylene with its low water vapour transmission is of definite interest. Polyethylene films are fairly

free of plasticizers and other additives and are quite extensively used as a part of lamination. Its ability to heat seal increases its value.

Low Density Polyethylene (LDPE) is an economical material with low WVTR, however, it has high permeabilities to flavours/volatiles, poor grease resistance and are limp. High-density polyethylene (HDPE) is stiffer, more translucent and has better barrier properties but needs higher temperature for sealing.

Later additions include high molecular weight high-density polyethylene (HM HDPE) and linear low-density polyethylene (LLDPE). HM HDPE is a paper like film with high physical strength and barrier properties, but is less transparent than ordinary polyethylenes. HM HDPE is available in twist-wrap grades. Polyethylene films are also suitable for making bags and pouches. A copolymer of polyethylene and poly vinyl alcohol, and EVOH has outstanding gas barrier properties specially when dry.

**Polypropylene**

Polypropylene films are undergoing a growth trend in the food industry. They have better clarity than polyethylenes and enjoy superior machineability due to stiffness. Lack of good sealability has been a problem, however, PVDC and vinyl coating have been used to overcome this problem. Some varieties of PP have been specially developed for twist-wrap applications as they have the ability to lock in position after twisting. Pearlised polypropylene with an opal finish and attractive gloss is also used. Both as laminates and overwraps, PP film is now widely used for all types of coated foods packaging applications.

Trays can be ordered in bulk in multiple sizes, or they can be custom molded to your products. These are the plastic trays you find inside deluxe two-piece boxes or gift boxes that hold products in place.

**Mainly aluminium and steel metal cans are also used for such premium products.**

**The Pomegranates packed in Primary and Secondary packages are finally packed into cartons.**

The modified atmosphere packaging offered an additional innovative tool for the optimal use and value addition of lower grade pomegranate fruits. The minimally processed pomegranate arils and frozen arils packed in punnets This new sector of pomegranate industrial processing will allow the use of non-commercial pomegranate fruits with some physical defects and fruit disorders, having the good quality juice and seeds, to the preparation of these new products, thus improving pomegranate utilization for human health.

## Detailed Project Assumptions

This model DPR for Chocolate coated Pomegranate manufacturing unit is basically prepared as a template based on certain assumptions (Table) that may vary with capacity, location, raw materials availability etc. An entrepreneur can use this model DPR format and modify as per requirement and suitability. The assumptions made in preparation of this particular DPR are given in Table mentioned below.

| Detailed Project Assumptions | | | |
|---|---|---|---|
| Parameter | Assumption | | |
| Capacity of the Unit | 150 | MT/annum | |
| Utilization of capacity | 1st Year Implementation, 70% in second, 80% in third and 90% in fourth year onwards | | |
| Working days per year | 300 | days | |
| Working hours per day | 8 | hours | |
| Interest on term and working capital loan | 12 | | |
| Repayment period | Seven year with one-year grace period is considered. | | |
| Average prices of raw material | Rs. 45 per Kg | | |
| Average sale prices of RTS beverage/litre | 240 | Rs/kg | |
| Seed extraction | 60% | | |
| Chocolate coated Pomegranate | 1.2 Kg Product/ kg Pomegranate seeds | | |

## Fixed Capital Investment

### 1. Land and Building

Land development, building and construction: 20 x 32 x 12 ft area = Rs. 4.4 Lacs

### 2. List of Equipment for Project

| Sr. No | Equipment | Quantity | Capacity | Amount (in Lakhs) |
|---|---|---|---|---|
| 1 | Pomegranate Washing Tank with conveyor | 1 No. | 70 kg/hour | 2.1 |

| | | | | |
|---|---|---|---|---|
| 2 | Pomegranate Sorter | 1 No. | Continuous | 0.8 |
| 3 | Pomegranate de seeder | 1 No. | 100 kg/Hour | 1.2 |
| 4 | Pomegranate Blanching Tank | 1 No. | 100 Kg/batch | 1.6 |
| 5 | Pomegranate Aeration Unit with conveyor | 1 No. | Continuous | 0.95 |
| 6 | Pomegranate feeder with conveyor | 1 No. | 0 to 30 Kg/hr | 0.55 |
| 7 | Chocolate Melting Tank with conveyor | 1 No. | 50 Kg | 0.58 |
| 9 | Chest cooler | 1 no | $0^0$C to $4^0$C | 0.70 |
| 10 | Trolley with trays | 1 set | Suitable | 0.50 |
| 11 | Miscellaneous | 1 lot | Suitable | 1.4 |
| | TOTAL | | | 10.38 |

**3. <u>Utilities and Fittings</u>**

Power and Water: Rs. 2.2 Lacs

4. **<u>Other Fixed Assets</u>**

Furniture and Fixtures : Rs. 0.9 Lacs

**5. <u>Pre-Operative Expenses</u>**

Legal expenses, start-up expenses, establishment cost, consultancy fee, trial runs, & others : **Rs. 0.90 LACS**

**6. Total Fixed capital Investment**

Total Fixed Capital Investment = (Land & Building + Machinery & Equipment+ Utilities and Fittings + Other Fixed Assets + Pre-operative Expenses) = (4.4 +10.38 + 2.2 +0.9 +0.9) = Rs. 18.82 Lacs

## Working Capital Requirement

Working Capital Requirement

(Rs. in Lakh)

| Particulars | Period | Year 2 (70%) | Year 3 (80%) | Year 4 (90%) |
|---|---|---|---|---|
| Raw material stock | 7 days | 3.20 | 3.66 | 4.71 |
| Work in progress | 15 days | 6.41 | 7.32 | 9.41 |
| Packing material | 15 days | 0.23 | 0.26 | 0.33 |
| Finished goods' stock | 15 days | 7.85 | 8.97 | 11.53 |
| Receivables | 30 days | 15.70 | 17.94 | 23.06 |
| Working expenses | 30 days | 1.52 | 1.74 | 2.23 |
| Total current assets | | 34.90 | 39.88 | 51.28 |
| Trade creditors | | 0.00 | 0.00 | 0.00 |
| Working capital gap | | 34.90 | 39.88 | 51.28 |
| Margin money (25%) | | 8.72 | 9.97 | 12.82 |
| Bank finance | | 26.17 | 29.91 | 38.46 |

## Total Project Cost and Means of Finance

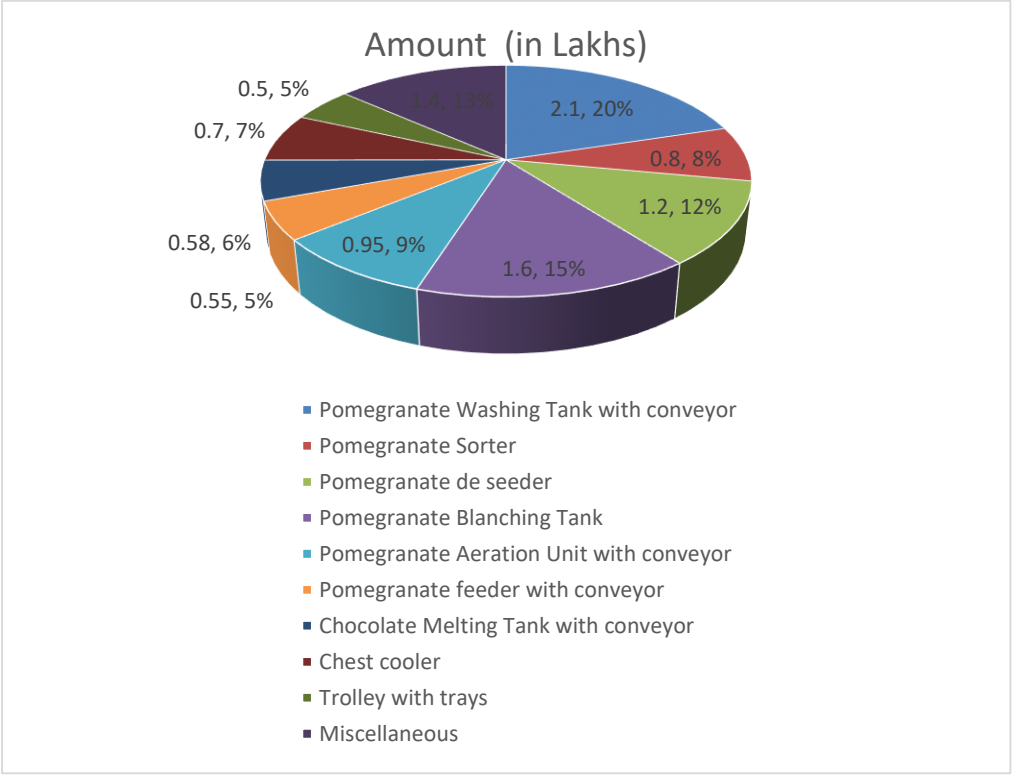
Total Project Cost and Means of Finance (Rs. in Lakh)

| Particulars | Amount in Lakhs |
|---|---|
| i. Land, building and civil construction (20 x 32 x 12 ft -LxBxH) | 4.44 |
| ii. Plant and machinery | 10.38 |
| iii. Utilities & Fittings | 2.2 |
| iv. Other Fixed assets | 0.9 |
| v. Pre-operative expenses | 0.90 |
| vi. Contingencies | 1.00 |
| vii. Working capital margin | 0.25 |
| Total project cost (i to vii) | 20.07 |
| Means Of finance | |
| i. Subsidy | 6.62 |
| ii. Promoters Contribution | 4.01 |
| iii. Term Loan (@10%) | 9.43 |

## Man Power Requirement

| | | | |
|---|---|---|---|
| Total Monthly Salary (Rs.) | No of Persons | Wages | Total Monthly |
| Supervisor (can be the owner) | 1 | 18000 | 18000 |
| Technician | 1 | 14000 | 14000 |
| Semi-skilled | 2 | 7600 | 15200 |
| Helper | 1 | 5500 | 5500 |
| Sales man | 1 | 8000 | 8000 |
| | | Total | Rs. 60700 Per Month |

## Graphical representation of costs



## EXPENDITURE, REVENUE and PROFITABILITY ANALYSIS

| | Expenditure, Revenue and Profitability Analysis | | | | | | |
|---|---|---|---|---|---|---|---|
| | Particulars | 1st Year | 2nd Year | 3rd Year | 4 th Year | 5th year | 6th year |
| A | Total Installed Capacity (MT) | 135 MT Pomegranate/Annum | 105 | 120 | 135 | 135 | 135 |
| | Capacity utilization (%) | Under Const. | 70% | 80% | 90% | 90% | 90% |
| B | **Expenditure (Rs. in Lakh)** | 0 | | | | | |
| | Raw Pomegranate (Av. Price @ Rs. 45/Kg) | 0.00 | 42.53 | 48.60 | 54.68 | 54.68 | 54.68 |
| | Chocolate @ 240/kg | 0.00 | 25.20 | 28.80 | 32.40 | 32.40 | 32.40 |
| | Packaging materials (Rs 3 per Kg) | 0.00 | 3.15 | 14.40 | 16.20 | 16.20 | 16.20 |
| | Utilities (Electricity, Fuel) | 0.00 | 5.38 | 2.26 | 2.55 | 2.55 | 2.55 |
| | Salaries (1st yr. only manager's salary) | 2.16 | 7.28 | 7.28 | 7.28 | 7.28 | 7.28 |
| | Repair & maintenance | 0.00 | 0.70 | 0.80 | 0.90 | 0.90 | 0.90 |
| | Insurance | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| | Miscellaneous expenses | 0.50 | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 |
| | **Total Expenditure** | **2.96** | **86.84** | **104.75** | **116.61** | **116.61** | **116.61** |
| C | **Total Sales Revenue (Rs. in Lakh)** | **0.00** | **252.00** | **288.00** | **324.00** | **324.00** | **324.00** |
| | Sale of Chocolate coated Pomegranate (Av. Sale Price @ Rs.240/kg) | 0.00 | 252.00 | 288.00 | 324.00 | 324.00 | 324.00 |
| D | **PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows** | **-2.96** | **165.17** | **183.25** | **207.39** | **207.39** | **207.39** |
| | Depreciation on civil works @ 5% per annum | 0.22 | 0.21 | 0.20 | 0.19 | 0.18 | 0.17 |
| | Depreciation on machinery @ 10% per annum | 1.04 | 0.93 | 0.84 | 0.76 | 0.68 | 0.61 |
| | Depreciation on other fixed assets @ 15% per annum | 0.47 | 0.40 | 0.34 | 0.29 | 0.24 | 0.21 |
| | Interest on term loan @ 12% | 1.14 | 1.14 | 1.12 | 0.88 | 0.64 | 0.40 |
| | Interest on working capital @ 12% | 0.00 | 3.14 | 3.59 | 4.61 | 4.61 | 4.61 |
| E | Profit after depreciation and Interest (Rs. in Lakh) | **-5.83** | **162.48** | **180.76** | **205.28** | **205.65** | **206.00** |
| F | Tax (assumed 30%) (Rs. in Lakh) | **0.00** | **48.75** | **54.23** | **61.58** | **61.70** | **61.80** |
| G | Profit after depreciation, Interest & Tax (Rs. in Lakh) | **-5.83** | **113.74** | **126.53** | **143.70** | **143.96** | **144.20** |
| H | Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh) | -2.60 | 52.40 | 61.70 | 70.70 | 70.40 | 70.20 |
| I | Coverage available (Rs. in Lakh) | -2.60 | 52.40 | 61.70 | 70.70 | 70.40 | 70.20 |
| J | Total Debt Outgo (Rs. in Lakh) | 1.14 | 3.14 | 3.12 | 2.88 | 2.64 | 2.40 |
| K | Debt Service Coverage Ratio (DSCR) | -2.28 | 16.96 | 19.78 | 24.55 | 26.67 | 29.25 |
| | Average DSCR | 19.11 | | | | | |
| L | Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh) | -4.10 | 134.78 | 149.60 | 169.56 | 169.74 | 169.91 |
| M | Payback Period (on Rs. 20. Lakhs initial investment) | | | | | | |

## Re Payment Schedule

| | Amount in Lakhs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Outstanding loan at start of yr. | Disbursement | Total outstanding Loan | Surplus for repayment | Interest payment | Repayment of principal | Total Outgo | o/s Loan at the end of the yr. | Balance left |
| 1 | 0 | 14 | 14 | -2.6 | 1.14 | 0 | 1.14 | 14 | -1.46 |
| 2 | 14 | | 14 | 52.4 | 1.14 | 2 | 3.14 | 12 | 49.76 |
| 3 | 12 | | 12 | 61.7 | 1.12 | 2 | 3.12 | 10 | 59.08 |
| 4 | 10 | | 10 | 70.7 | 0.88 | 2 | 2.88 | 8 | 68.32 |
| 5 | 8 | | 8 | 70.4 | 0.64 | 2 | 2.64 | 6 | 68.26 |
| 6 | 6 | | 6 | 70.2 | 0.40 | 2 | 2.40 | 4 | 68.30 |
| 7 | 4 | | 4 | 70.17 | 0.16 | 2 | 2.16 | 2 | 68.51 |
| 8 | 2 | | 2 | 70.16 | -0.08 | 2 | 1.92 | 0 | 68.74 |

## ASSET'S DEPRECIATION

Assets' Depreciation (Down Value Method) Amount in Lakhs

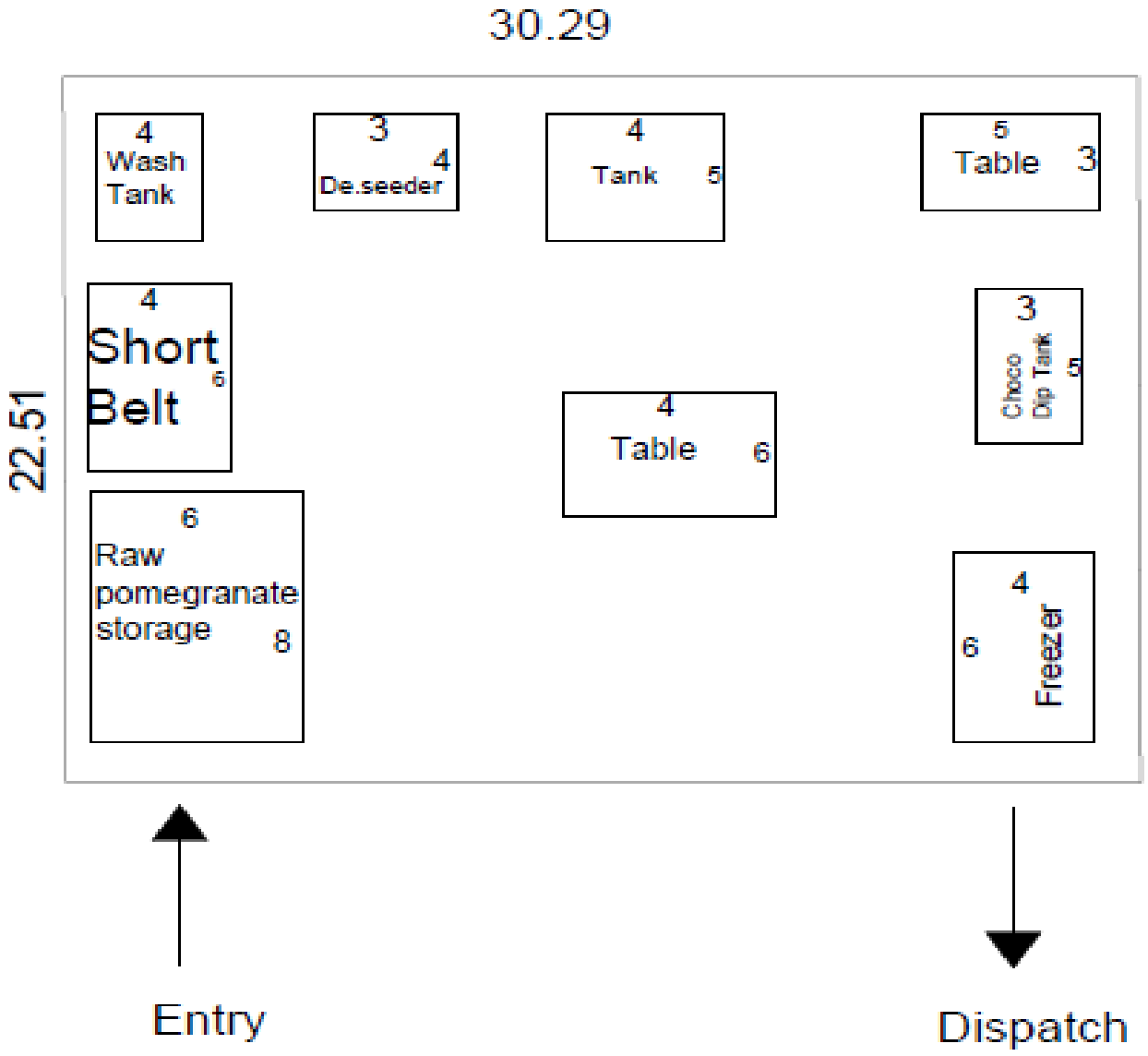
| Particulars | 1st Year | 2nd year | 3 rd year | 4th year | 5th year | 6th year | 7th year | 8th year |
|---|---|---|---|---|---|---|---|---|
| Civil works | 4.44 | 4.22 | 4.01 | 3.81 | 3.62 | 3.44 | 3.26 | 3.10 |
| Depreciation | 0.22 | 0.21 | 0.20 | 0.19 | 0.18 | 0.17 | 0.16 | 0.16 |
| Depreciated value | 4.22 | 4.01 | 3.81 | 3.62 | 3.44 | 3.26 | 3.10 | 2.95 |
| | | | | | | | | |
| Plant & Machinery | 10.38 | 9.34 | 8.41 | 7.57 | 6.81 | 6.13 | 5.52 | 4.96 |
| Depreciation | 1.04 | 0.93 | 0.84 | 0.76 | 0.68 | 0.61 | 0.55 | 0.50 |
| Depreciated value | 9.34 | 8.41 | 7.57 | 6.81 | 6.13 | 5.52 | 4.96 | 4.47 |
| | | | | | | | | |
| Other Fixed Assets | 3.10 | 2.64 | 2.24 | 1.90 | 1.62 | 1.38 | 1.17 | 0.99 |
| Depreciation | 0.47 | 0.40 | 0.34 | 0.29 | 0.24 | 0.21 | 0.18 | 0.15 |
| Depreciated value | 2.64 | 2.24 | 1.90 | 1.62 | 1.38 | 1.17 | 0.99 | 0.84 |
| | | | | | | | | |
| All Assets | 17.92 | 16.20 | 14.65 | 13.28 | 12.04 | 10.94 | 9.95 | 9.06 |
| Depreciation | 1.73 | 1.54 | 1.38 | 1.23 | 1.10 | 0.99 | 0.89 | 0.80 |
| Depreciated value | 16.20 | 14.65 | 13.28 | 12.04 | 10.94 | 9.95 | 9.06 | 8.26 |

## Financial Assessment of the Project

| **Financial Assessment of the Project**<br>**Benefit Cost Ratio (BCR) and Net Present Worth (NPW)** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Particulars | 1st Year | 2nd year | 3 rd year | 4th year | 5th year | 6th year | 7th year | 8th year | |
| Capital cost (Rs. in Lakh) | 20.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Recurring cost (Rs. in Lakh) | 2.96 | 86.84 | 104.75 | 116.61 | 116.61 | 116.61 | 116.61 | 116.61 | |
| Total cost (Rs. in Lakh) | 23.03 | 86.84 | 104.75 | 116.61 | 116.61 | 116.61 | 116.61 | 116.61 | 797.64 |
| Benefit (Rs. in Lakh) | 0.00 | 252.00 | 288.00 | 324.00 | 324.00 | 324.00 | 324.00 | 324.00 | |
| Total Depreciated value of all assets (Rs. in Lakh) | | | | | | | | 8.25 | |
| Total benefits (Rs. in Lakh) | 0.00 | 252.00 | 288.00 | 324.00 | 324.00 | 324.00 | 324.00 | 332.26 | 2168.26 |
| **Benefit-Cost Ratio (BCR): (Highly Profitable project)** | **2.7184** | | | | | | | | |
| **Net Present Worth (NPW):** | **1370.62** | | | | | | | | |

**Break-Even Analysis**

| Sr. No. | Particulars | 1st Year | 2nd year | 3 rd year | 4th year | 5th year | 6th year | 7th year | 8th year |
|---|---|---|---|---|---|---|---|---|---|
| | Capacity utilization (%) | Under Const. | 70% | 80% | 90% | 90% | 90% | 90% | 90% |
| | Production MT/Annum | | 105 | 120 | 135 | 135 | 135 | 135 | 135 |
| A | Fixed Cost (Rs. in Lakh) | | | | | | | | |
| | Permanent staff salaries | 7.28 | 7.28 | 7.28 | 7.28 | 7.28 | 7.28 | 7.28 | 7.28 |
| | Depreciation on building @ 5% per annum | 0.22 | 0.21 | 0.20 | 0.19 | 0.18 | 0.17 | 0.16 | 0.16 |
| | Depreciation on machinery @ 10% per annum | 1.04 | 0.93 | 0.84 | 0.76 | 0.68 | 0.61 | 0.55 | 0.50 |
| | Depreciation on other fixed assets @ 15% per annum | 0.47 | 0.40 | 0.34 | 0.29 | 0.24 | 0.21 | 0.18 | 0.15 |
| | Interest on term loan | 1.14 | 1.14 | 1.12 | 0.88 | 0.64 | 0.40 | 0.16 | -0.08 |
| | Insurance | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| | Total Fixed Cost (Rs. in Lakh) | 10.45 | 10.26 | 10.08 | 9.70 | 9.33 | 8.98 | 8.63 | 8.30 |
| B | Sales Revenue (Rs. in Lakh) | 0.00 | 252.00 | 288.00 | 324.00 | 324.00 | 324.00 | 324.00 | 324.00 |
| C | Variable Cost (Rs. in Lakh) | | | | | | | | |
| | Raw Pomegranate (Av. Price @ Rs.45/Kg) | 0.00 | 42.53 | 48.60 | 54.68 | 54.68 | 54.68 | 54.68 | 54.68 |
| | Chocolate @ 240 per kg | 0.00 | 25.20 | 28.80 | 32.40 | 32.40 | 32.40 | 32.40 | 32.40 |
| | Other ingredients | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Packaging materials | 0.00 | 3.15 | 3.60 | 4.05 | 4.05 | 4.05 | 4.05 | 4.05 |
| | Casual staff salaries | 0.00 | 5.78 | 5.78 | 5.78 | 5.78 | 5.78 | 5.78 | 5.78 |
| | Utilities (Electricity, Fuel) | 0.00 | 5.38 | 6.14 | 6.91 | 6.91 | 6.91 | 6.91 | 6.91 |
| | Repair & maintenance | 0.00 | 0.70 | 0.80 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| | Miscellaneous expenses | 0.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| | Interest on working capital @ 12% | 0.00 | 3.14 | 3.59 | 4.61 | 4.61 | 4.61 | 4.61 | 4.61 |
| | Total Variable Cost (Rs. in Lakh) | 0.50 | 87.88 | 99.32 | 111.34 | 111.34 | 111.34 | 111.34 | 111.34 |
| D | Break Even Point (BEP) | | | | | | | | |
| | as % of sale | - | 12.00 | 10.00 | 8.00 | 8.00 | 7.00 | 7.00 | 6.00 |
| | Break Even Point (BEP) in terms of sales value (Rs. in Lakhs) | - | 30.24 | 28.80 | 25.92 | 25.92 | 22.68 | 22.68 | 19.44 |




**All Dimensions in ft.**

**Machinery Suppliers**

There are many machinery suppliers available within India for fruit-based beverage processing machineries and equipments. Some of the suppliers are:

1. Nikam Engineers

2.Bajaj Process Pack

**Limitations of the DPR**

i. This DPR has provided only the basic standard components and methodology to be adopted by an entrepreneur while submitting a proposal under the Formalization of Micro Food Processing Enterprises Scheme of MoFPI.

ii. This DPR is made to provide general methodological structure not for specific entrepreneur/crops/location. Therefore, information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of business, background of proposed project, location, raw material base/contract sourcing, entrepreneur's own SWOT analysis, market research, rationale of the project for specific location, community advantage/benefit, employment generation etc are not given in detail.

iii. The present DPR is based on certain assumptions on cost, prices, interest, capacity utilization, output recovery rate and so on. However, these assumptions in reality may vary across places, markets and situations; thus, the resultant calculations will also change accordingly.

**Guidelines for the Entrepreneurs**

i. The success of any prospective food processing project depends on how closer the assumptions made in the initial stage are with the reality of the targeted market/place/situation. Therefore, the entrepreneurs must do its homework as realistic as possible on the assumed parameters.

ii. This model DPR must be made more comprehensive by the entrepreneur by including information on the entrepreneur, forms and structure (proprietorship/

partnership/ cooperative/ FPC/ joint stock company) of entrepreneur's business, project location, raw material costing base/contract sourcing, detailed market research, comprehensive dehydrated product mix based on demand, rationale of the project for specific location, community advantage/benefit from the project, employment generation, production/ availability of the raw materials/ crops in the targeted area/ clusters and many more relevant aspects for acceptance and approval of the competent authority.

iii. The entrepreneur must be efficient in managing the strategic, financial, operational, material and marketing aspects of a business. In spite of the assumed parameter being closely realistic, a project may become unsustainable if the entrepreneur does not possess the required efficiency in managing different aspects of the business and respond effectively in changing situations.

iv. The machineries should be purchased after thorough market research and satisfactory demonstration.

v. The entrepreneur must ensure uninterrupted quality raw materials' supply and maintain optimum inventory levels for smooth operations management.

vi. The entrepreneur must possess a strategic look to steer the business in upward trajectory.

vii. The entrepreneur must maintain optimum (not more or less) inventory, current assets. Selecting optimum source of finance, not too high debt-equity ratio, proper capital budgeting and judicious utilization of surplus profit for expansion is must.

viii. The entrepreneur must explore prospective markets through extensive research, find innovative marketing strategy, and maintain quality, adjust product mix to demand.

ix. The entrepreneur must provide required documents on land, financial transaction, balance sheet, further project analysis as required by the competent authority for approval.

x. The entrepreneur must be hopeful and remain positive in attitude.