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**DEPARTMENT: MECHANICAL ENGINEERING**

**COURSE TITLE: TECHNOLOGICAL POLICY AND PLANING**

**COURSE CODE: ENG 582**

**ASSIGNMENT 1**

**FEASIBLITY STUDY ON THE SET UP OF A FACE MASK FIRM FOR USE AT THE ABUAD COMMUNITY**

**SUMMARY OF THE PROJECT**

1. Name of the firm: Vitality Face Mask Production Company Ltd
2. Location: km 8.5 Afe Babalola Way, Ado-Ekiti.
3. Project Description: A face mask is a medical equipment worn on the face to prevent from breathing bad air or from spreading germs or protection of the face in a serious situation. The face mask has been generally worn by the public all year in some countries such as China, Japan and South Korea etc. to reduce the spread of airborne diseases to others and also prevent breathing in dust particles created by air pollution. The face masks came into use since the early 1960s in developed countries but the present COVID-19 pandemic has been a subject of debate on the use of face masks as shortages of face masks has become a central issue. As regards the present COVID-19 pandemic, government and health officials recommend that people wear face masks when venturing out to public settings where social distancing may be difficult. The essence of this project is to produce face masks in the ABUAD community which be readily available and also easily accessible for everyone at a very affordable rate. This reduces the association for the purchase of face mask and also competition from other face mask production firms which may not be close to proximity, hence saving time. The presence of wonderful sewists and talented folks on board is held to a solid and consistent standard in order to assure you receive a high quality and protective mask.

**GENERAL INFORMATION**

A. Project Management

1. During the pre-operating period, appropriate permissions and manufacturing licenses would be acquired so as to ensure the smooth running of the operation on commencement. Workers & Operators would mainly be sourced from within the ABUAD community.

2. During the operating period, unit heads will be assigned over group of workers to relay information to the plant manager for quick action. Flow charts and process diagrams would be employed so as to ensure the continuous and smooth operation.

3. The employed workers will undergo rigid On-The-Job training g from higher qualified personnel so as to quickly raise their skill level. Incentives would also be available for extra hours and high risk jobs around the facility.

Roles

1. President: He is in-charge of the overall company and his decision is final since he is solely in charge of the decision making.

2. Vice President: In charge of accessing all information before reaching the president and deem which ones are attention worthy or not. Supervision is often carried out and progress report is being submitted directly to him by the head of other departments.

3. Marketing: They are in charge of market prediction and management of all advertisement related to the face mask as they seek to push the product aggressively into the market. Price variation, demand and supply forecast, market analysis, advertisement are being controlled by the marketing team with the aim of maximizing sale and profit.

4. Sale: They are in charge of all the sales and they manage all the distribution channels. They ensure that the product is of standard quality through good quality control procedures. They control the price, demand and supply of the face mask as their goal is to achieve maximum profit with minimum cost.

5. Services: They are in charge of goods, production and distribution and they strive to ensure that the customers stay happy at all times. They are in charge of producing high quality product while keeping good customer relations.

**ECONOMIC ASPECTS**

A. Market Study

1. Demand:

The demand for face masks is influenced by several related factors. As the face masks are consumed by surgeons during surgeries, the demand is influenced by the following factors:

i. Prevalence of diseases requiring surgery

ii. Development in health care, hospital facilities and operation theatres.

The main factors that drive the medical drive market is the growing awareness of health and safety measures that have to be employed in order to stop spread of diseases. Patients and health medics have recognized the increasing need for gloves globally. The healthcare and the medical industry is growing at a fast rate thus increasing the growth of face mask market as it is the staple product required in this industry.

Face masks may be disposable, but in the operating room they are indispensable. Despite lingering effects of a down economy and declining medical equipment and supply sales, the market for face masks continues to grow. There exists immense opportunities for growth in the global surgical face masks market the fact that dozens of face masks are utilized in a single day in hospitals and laboratorial settings, and the inherent intrinsic indispensability of the product among surgeons, practitioners, and healthcare workers.

2. Supply

The company will be able to tap into the already existing demand by the ABUAD community and effectively meet this demand. Since it is locally manufactured, there will be little or no competition allowing domination of the market with our product. The face masks will be handed out free of charge and we will also encourage once mask is used they should all be disposed properly.

B. Marketing Program

1. No pre-existing practice or competitors exist in this space (ABUAD). The company is a pioneer in this field.

2. For ease of access to the face masks, they will be sold and distributed in highly active areas with large number of people.

3. The university will be responsible for sensitizing its students about the use and the need of the face masks.

**TECHNICAL FEASIBILITY**

A. Product (s)

1. Description of the product including specifications relating to their physical, mechanical and chemical properties.

The face mask is a loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. They are effective barriers for retaining large droplets from the mouth and nose by the wearer in public. They help in reducing the exposure of the wearer’s saliva and respiratory secretions to others.

Physical form

The design of the face mask depends on the mode; usually, the masks are three-ply (three layers). This three-ply material is made of a melt-blown polymer, most commonly polypropylene, placed between non-woven fabrics. The melt-blown material acts as the filter that stops microbes from entering or exiting the mask. Pleats are commonly used to allow the user to expand the mask such that it covers the area from the nose to the chin. The masks are secured to the head with ear loops, head ties, or elastic straps.

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| --- | --- |
| Parameter | Typical Unit |
| Pressure differential | Cm of H20/cm2 |
| Filtration and exposure | % |
| Liquid penetration and resistance | Mbar |
| Air permeability | Ml/s.cm2 at 100Pa |
| Water vapor permeability | g/24hr.cm2 |
| Water repellency | Grade |

2. Uses of the product(s)

1. Used during surgical operations and health care procedures to catch microorganisms in liquid droplet
2. Used in reducing the risk of infection among health care workers and the community
3. Used in reducing the exposure of the wearer to to infectious aerosols and airborne diseases
4. Used in the community for maintaining good hygiene
5. Used in certain areas such as Asia to reduce the rising issue of smog
6. Also to remind wearers not to touch their mouth, nose which could otherwise transfer bacteria after having touched a contaminated surface

B. Manufacturing Process

1. Description of the process

The production: The face masks are made with non-woven fabric, which has better bacteria filtration and air permeability while remaining less slippery than woven cloth. The material most commonly used to make them is polypropylene, either 20 or 25 grams per square meter (gsm) in density. Masks can also be made of polystyrene, polycarbonate, polyethylene, or polyester.

20 gsm mask material is made in a spun bond process, which involves extruding melted plastic onto a conveyor. The material is extruded in a web, in which strands bond with each other as they cool. 25 gsm fabric is made through melt blown technology, which is a similar process where plastic is extruded through a die with hundreds of small nozzles and blown by hot air to become tiny fibers, again cooling and binding on a conveyor. These fibers are less than a micron in diameter. The masks are made up of a multi-layered structure, generally by covering a layer of textile with non-woven bonded fabric on both sides. Non-wovens, which are cheaper to make and cleaner thanks to their disposable nature, are made with three or four layers. These disposable masks are often made with two filter layers effective at filtering out particles such as bacteria above 1 micron. The filtration level of a mask, however, depends on the fiber, the way it’s manufactured, the web’s structure, and the fiber’s cross-sectional shape. Masks are made on a machine line that assembles the nonwovens from bobbins, ultrasonically welds the layers together, and stamps the masks with nose strip, ear loops, and other pieces. Completed masks are then sterilized before being sent out to the factory.

2. The face Masks test

Once the face masks are made, they must be tested to ensure their safety in various situations. There are five tests to be carried out:

1. Bacteria filtration Efficiency in vitro (BFE): This test works by shooting an aerosol with staphylococcus aureus bacteria at the mask at 28.3 liters per minute. This ensures the mask can catch the percentage of bacteria it’s supposed to.
2. Particle Filtration Efficiency: Also known as the latex particle challenge, this test involves spraying an aerosol of polystyrene microspheres to ensure the mask can filter the size of the particle it’s supposed to.
3. Breathing resistance: To ensure the mask will hold its shape and have proper ventilation while the wearer breathes, breathing resistance is tested by shooting a flow of air at it, then measuring the difference in air pressure on both sides of the mask.
4. Splash resistance: In splash resistance tests, face masks are splashed with simulated fluid using forces similar to human fluid pressure to ensure the liquid cannot penetrate and contaminate the wearer.
5. Flammability: Since several elements can cause fire, the face masks are tested for flammability by being set on fire to measure how slowly it catches and how long the material takes to burn.

**FINANCIAL FEASIBILITY**

A. Total Project Cost- All items considered and assumptions made.

It has an estimated cost of about 400 million naira

B. Initial Capital Requirements- All items considered and assumptions made. At least half the money was sourced for and the other half contributed by investors after stating the initial capital at hand which was about 120 million naira.

C. Sources of Financing

i. Large donation from friends and associates.

ii. Loans from banks with attractive interest rates.

iii. Revenue from Abuad tuition fee

iv. Investors

v. Initial capital

D. Financial statement

1. Projected income statements for 10 years Business has been looking good and it is projected to rise over the next couple of years.