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**COURSE TITLE: TECHNOLOGICAL POLICY AND PLANING**

**COURSE CODE: ENG 582**

ASSIGNMENT 1

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

## I. PROJECT SUMMARY

A. **Name of the firm:** Galaxy Healthcare

B. **Location:** Km. 8.5 Afe Babalola Way, Ado-Ekiti.

C. **Project Description**:

This project, a face mask production firm, which is set to be established within the Abuad community, is a raucous cry against the spread of germs and flu during this pandemic. It has brought to light the state of unhygienic practices which has always lurked beneath the surface of today's society. The need to accomplish this project is of many importance and benefits to the staff and students of this university, the neighboring communities as well as the nation as a whole. A locally made face mask will cut down the cost of the face masks from importation to customs to taxes. The wealth of Nigeria as a nation would be circulated amongst the masses and help make such a necessary commodity available for all. At the end of the pandemic, the need for the facemasks would not diminish as doctors and nurses would be in use of this when entering a ward or during a surgical procedure.

D. Market Projection:

It is projected that the demand for face masks during this pandemic would be on a rise as the demand outweighs the supply and hence there is a need to close the gap by producing more face masks.

Prices

Due to the recent outbreak of the covid-19 virus there is a surge in the demand for face masks for the protection of medical practitioners but this has been made difficult as the prices of rubber has increased due to its increase in demand hence resulting in a change in thr material for the face masks. Using two layers of polyester-spandex chiffon results in making the price of the of face masks affordable.

Source of Funding

i. Donation from the state and federal government
ii. Large donation from friends and associates.
iii. Loans from banks with attractive interest rates.
iv. Revenue from Abuad tuition fee
v. Investors
vi. Initial capital

### E. Summary of Findings and conclusion

1. Market feasibility

   Since investors are mostly attracted to businesses with high ROI and lower risk this business fits the requirement as there is a higher demand for the product than ever and hence ABUAD can venture into this industry and thrive as there is excess demand over supply and there shall be competitive market position to obtain.

2. Technical feasibility

   After much research it has been verified that the project technical data has been sourced for and a large quantity of masks can be produced at a minimum cost. The cost incurred from building the facilities, buying and renting some equipment, studying the process involved in the mask manufacture, observing the method and channels of distribution and quality of the product has been shouldered and can be financed adequately.

3. Financial feasibility

   This is also feasible as the initial capital requirements, sources of financing, the total project cost and the financial statement has all been guaranteed. Also the financing of the management team and qualifications has been looked into while at the same time offering attractive salaries as the rival competitors. In conclusion, the profit to be generated from the business outweighs the initial capital investment.

## II. GENERAL INFORMATION

Management of the Project

1. During the pre-operating period, appropriate permissions and manufacturing licences 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 masks 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.

Status and timetable of project

The project is in progress as production is growing strong and workers work around the clock 8am-5pm. The tapping period and production of rubber is at its peak from September to January and that's when production is at its highest.

## III. ECONOMIC ASPECTS

A. Market Study

1. Demand

The demand for surgical masks is influenced by several related factors. As the surgical 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.
iii. Medical education and growth of surgeons in society.

The demand goes up when medical facilities, number of surgeons and surgeries taken place show improvement.

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 recognised the increasing need for masks globally. The healthcare and the medical industry is growing at a fast rate thus increasing the growth of surgical masks market as it is the staple product required in this industry.

Surgical 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 surgical masks continues to grow.

There exists immense opportunities for growth in the global surgical latex masks market the fact that dozens of pairs of medical masks are utilised 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
   a) The supply for the last 10 years has been on the rise due to the factors listed above

   The surgical masks are imported as finished goods and sold to major hospitals in Nigeria and the most common brand being Ansell surgical masks.

   For ABUAD producing surgical face masks locally
   b) The supply is set to be increasing gradually as medical surgeries have seen a slight increase in Nigeria
   c) The factors affecting the production would be adverse weather conditions slowing down the production of the rubber industry, unstable government policies and the
      emergence of deadly viruses would see the supply of the products increase.
1. Competitive position considering imported and/or substitute products
   a) The selling price would be around N10,000 per box considering the fact that import tariff would affect those importing the masks and our product is at an affordable and bargain price.

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 masks, they will be sold and distributed in highly active areas with large student traffic such as Colleges, Cafeterias and Hostels to name a few.

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

4.Promoting and advertising plan, including costs.

The marketing team is in charge of this aspect as they are driven towards increasing brand exposure and sales through targeted advertisement which costs about N1,000,000 annually. Promotions are carried out with discounts, sales clearance and so on.

5. Packaging

Table 1: Packaging Details

| | |
|---|---|
| Wrapper | 1 pair |
| Pouch | 1 pair |
| Inner Box | 50 pairs |
| Master Carton | 500 pairs (10 inner boxes) |
| 20 feet container | 2,34,500 pairs (469 cartons) |
| 40 feet HC container | 5,69,500 pairs (1139 cartons) |

C. Projected Sale

a. Expected annual volume of sales for the next ten (10) years considering the demand, supply, competitive position and marketing program.

Annual volume of sales is set to soar as demand and supply for the next 10 years would be on a rise because the nation would be preparing its medical sectors with all necessary equipment to combat the next wave of pandemic.

b. Sales contracts

Sales contract are in place with various hospitals, clinics, labs and food industries.

## IV. TECHNICAL FEASIBILITY

A. Product (s)

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

**N95 Respirators:** Occupational (including medical) use. Reduces wearer's exposure to particles including small particle aerosols and large droplets (all non-oil aerosols). Protects from exposure to airborne particles. In a healthcare setting, protects from exposure to biological aerosols including viruses and bacteria. Latex free.

**Surgical N95 Respirators**: Can be used in any occupational setting where an N95 respirator is appropriate. Medical use where a sterile field needs to be maintained. Reduces wearer's exposure to certain airborne particles (all non-oil aerosols) and provides a barrier to splashes, droplets and sprays. In a healthcare setting, protects from exposure to biohazards including viruses and bacteria. Latex free.

Table 2: Physical Property

| Characteristic | Specification | | |
|---|---|---|---|
| Material Composition | **Mask body** | Outer Layer | Spun-bonded fabric |
| | | Filter Layer | Meltblown fabric |
| | | Inner Layer | Needle bonded fabric |
| | **Nose clip** | Aluminum | |
| | **Elastic Band** | Polyurethane + Polyester | |
| Description | Molded contour mask ("cone" shape) with nosepiece, nose foam band inside and stretchable dual head strap. (Refer to Appendix 1 Specific Attribute) | | |
| Color | **Mask** | White | |
| | **Elastic Band** | Yellow | |
| Nose Clip Style<br>Nose Clip Dimension | Flat | | |
| | **Body Size** | Length | 131 mm (5 5/32") |
| | | Width | 114,5 mm (4 33/64") |
| | | Height | 50 mm (1 31/32") |
| | **Nose Clip** | Length | 88 mm (3 15/32") |
| | **Headband** | Upper Length | 300 mm (11 13/16") |
| | | Lower Length | 280 mm (11 1/32" |

Chemical composition: After rubber is being tapped from the trees because of its high water and non-rubber content about 70% is water, protein, sterol, glycosides, resins, ash and sugar. The latex is mixed with processing chemicals including Sulphur, zinc oxide, accelerators, pigment, stabilizers, a de-webbing agent and antioxidants. The latex matures for 24 to 36 hours to become a compound ready for dipping.

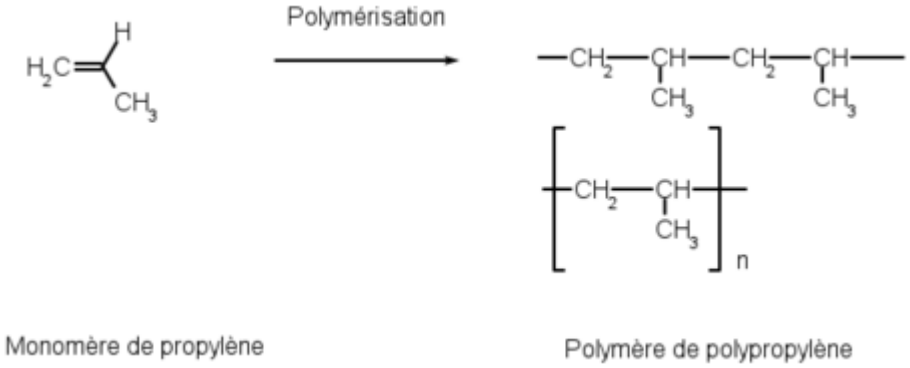
2. Uses of the product(s)

i. Used for surgical operations
ii. Used in the food industry to prevent chemical skin burns on their faces.
iii. Used in various homes for domestic purposes
iv. Used by all concerned medical staff during surgical procedures.

B. Manufacturing Process

1. Description of the process

Polypropylene is produced by the chain-growth polymerization of propene:




The industrial production processes can be grouped into gas phase polymerization, bulk polymerization and slurry polymerization. All state-of-the-art processes use either gas-phase or bulk reactor systems.[33]

- In gas-phase and slurry-reactors, the polymer is formed around heterogeneous catalyst particles. The gas-phase polymerization is carried out in a fluidized bed reactor, propene is passed over a bed containing the heterogeneous (solid) catalyst and the formed polymer is separated as a fine powder and then converted into pellets. Unreacted gas is recycled and fed back into the reactor.

- In bulk polymerization, liquid propene acts as a solvent to prevent the precipitation of the polymer. The polymerization proceeds at 60 to 80 °C and 30–40 atm are applied to keep the propene in the liquid state. For the bulk polymerization, typically loop reactors are applied. The bulk polymerization is limited to a maximum of 5% ethene as comonomer due to a limited solubility of the polymer in the liquid propene.
- In the slurry polymerization, typically C4–C6 alkanes (butane, pentane or hexane) are utilized as inert diluent to suspend the growing polymer particles. Propene is introduced into the mixture as a gas.

The properties of PP are strongly affected by its tacticity, the orientation of the methyl groups (CH
3) relative to the methyl groups in neighboring monomer units. The tacticity of polypropylene can be chosen by the choice of an appropriate catalyst.

A medical N95 respirator consists of multiple layers of nonwoven fabric, often made from polypropylene. The two outward protective layers of fabric, covering the inside and outside of the mask, are created using spun bonding. Spun bonding uses nozzles blowing melted threads of a thermoplastic polymer (often polypropylene) to layer threads between 15-35 micrometers on a conveyor belt, which build up into cloth as the belt continues down the line. Fibers are then bonded using thermal, mechanical, or chemical techniques. The two outer layers of the respirator, between 20 and 50 $g/m^2$ in density, act as protection against the outside environment as well as a barrier to anything in the wearer's exhalations.

Between the spun bond layers there's a pre-filtration layer, which can be as dense as 250 $g/m^2$, and the filtration layer. The prefiltration layer is usually a needled nonwoven. Nonwoven material is needle punched to increase its cohesiveness, which is accomplished by sending barbed needles repeatedly through the fabric to hook fibers together. The prefiltration layer is then run through a hot calendaring process, in which plastic fibers are thermally bonded by running them through high pressure heated rolls. This makes the pre-filtration layer thicker and stiffer, so it can be molded to form the desired shape and stay in that shape as the mask is used.

The last layer is a high efficiency melt-blown electret (or polarized) nonwoven material, which determines the filtration efficiency. Meltblowing is a process similar to spun bonding, in which multiple machine nozzles use air to spray threads of melted synthetic polymers onto a conveyor. However, these fibers are much smaller, as less than a micron wide. As the conveyor continues, the threads build up and bond by themselves as they cool, creating the fabric. However, sometimes melt-blown fabric is also thermally bonded to add strength and abrasion resistance, although the material then begins to lose some of its fabric characteristics.

The full respirators are made through converting machinery, which combines the layers through ultrasonic welding and adds straps and metal strips to adjust the mask over the user's nose. The respirators are then sterilized as a last step before being shipped.

**The quality-control phase**

Like surgical masks, N95s go through several tests to ensure their effectiveness. At the C.D.C., N95s are conditioned for 24 hours before testing by being kept in a 38 degree C environment with 85% relative humidity. During tests, the respirator's filtration ability must stay above its certification class level at all times. N95s are tested with:

- Charge neutralized sodium chloride aerosol spray, which features particles with a median of .3 microns in diameter. This tests for particle penetration.
- An airflow of 85 L per minute, which tests for a moderately high work rate.
- A breathing resistance test at 35 mm or below water column height pressure, and exhalation resistance at 25 mm or below water column height pressure (A millimeter of water column height pressure is the pressure from one millimeter of water at 39 degrees F).
- At least 200 mg of aerosol loading, which simulates a high level of exposure by clogging up the mask with aerosol particles.

These respirators are also tested for flammability, biocompatibility, fluid resistance, and particulate and bacteria filtration by the FDA. Under normal circumstances, respirators would need approval from both the FDA and NIOSH (the National Institute for Occupational Safety and Health). Because of the current pandemic, however, NIOSH-approved respirators not regulated by the FDA (such as those used in industrial settings) are now available for use by healthcare workers.

## V. FINANCIAL FEASIBILITY

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

It has an estimated cost of about 500 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 face which was about 150 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.