



Setting up Biscuits Production Company in Ghana

Thesis

Asmah Frank

Degree Programme in Industrial Management
Engineering and International Business

Accepted ____ . ____ . ____ _____

SAVONIA UNIVERSITY OF APPLIED SCIENCES
Technology, Communication and Transport

THESIS
Abstract

Degree Programme: Industrial Management

Option: Engineering and International Business Management

Authors: Frank Asmah

Title of Thesis: Setting up Biscuits Production Company in Ghana

Date: 19/01/2011

Pages / appendices: 42

Supervisor: Mika Hentunen

Contact persons: Mr. Francis Kwatia, General Manager, Adom Fofro Biscuits Limited

The goal of this project was to obtain the knowledge for a good plan of setting up a biscuits production company. The idea is to enter the Ghanaian market and to be able to compete. In many production fields there is competition. Therefore planning will be the key for efficient production which ensures profitability and minimal cost. Cheap labor, low price of the product and also availability of the product at the right time are important

A detailed plan was produced, which includes all the sections and the activities of production, including warehousing, purchasing, distribution and the expense. In conclusions this project is taking into account the internal economical climate of Ghana and all the advantages and drawbacks of it, as well as financial aspects of the company which includes a financing plan and forecasting.

Keywords: (Biscuit production, supply chain, marketing)

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1 INTRODUCTION

Background

The original plan is to start biscuit production in the near future. The production facility will be situated in central Ghana in a town called Cape Coast (figure 1). The availability of cheap labor and the existing facilities are most important. There are several factors which were against this decision and the most important one is transportation costs, due to the remote situation of the company from the main consuming areas of the Cities Takoradi, Kumasi, Accra and Cape coast.

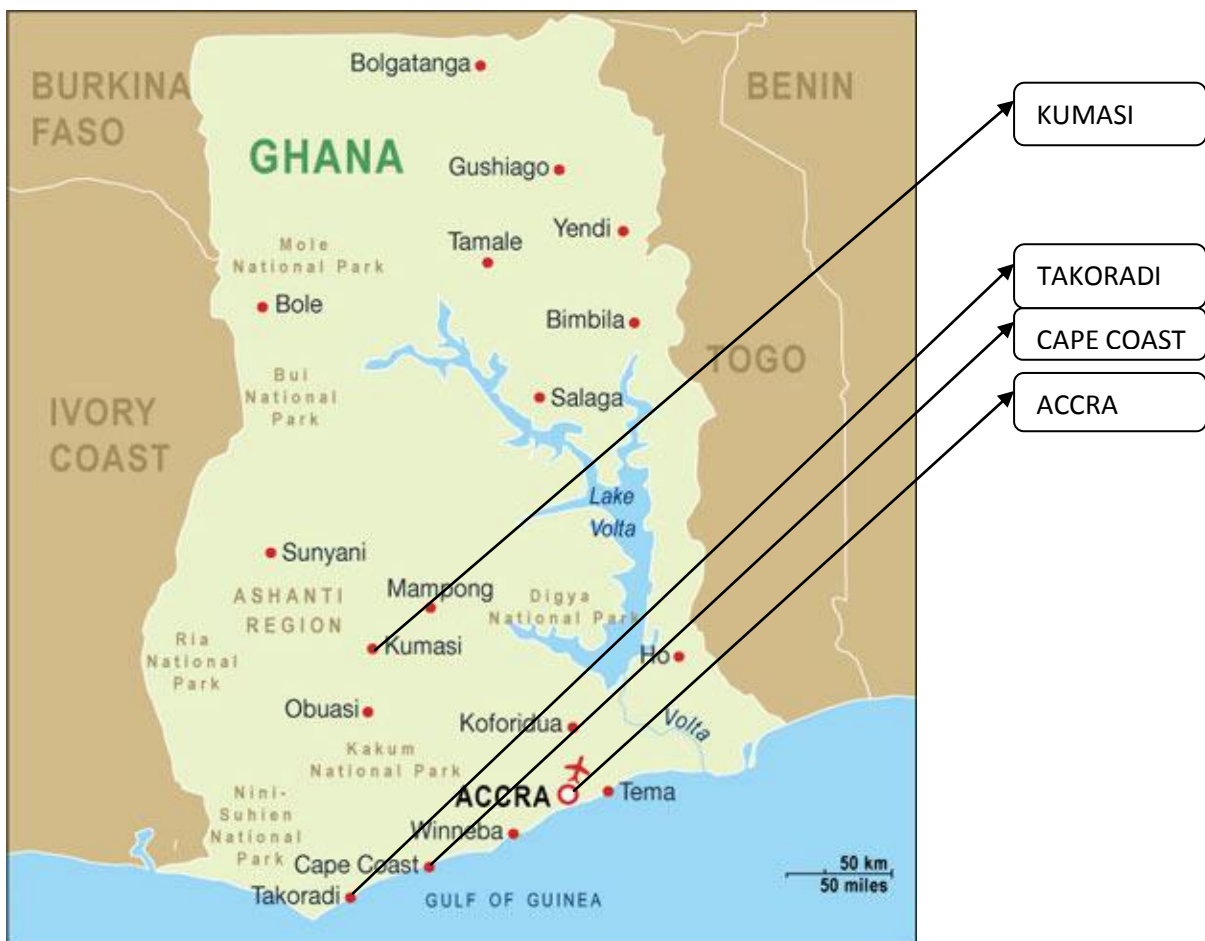


Figure 1. Map of Ghana and Cape Coast town.

One of the goals of the company is to focus on constantly increasing the production level from 150 kilograms to 400-500 kilograms per week and produced amount of biscuits and moving from a rented facility to the company's own building when the market will improve in all the four cities.

1.2 Production Operation

Production operation is the preparation of raw materials, filling, mixing, baking and packaging including available capacity and safety. Other supporting activities, such as available skills, warehousing, the layout of the plant and maintenance requirements will be taken into account.

In that case some areas have to be considered such as design and layout of the factory (equipment, offices), future demand (volume, timing) and so on. The role of this project is to ensure quality; on time delivery and reliability in the product will attract consumers.

Companies' own warehouses are nowadays popular in Ghana and the interesting part of it is that the prices are affordable which I think is good for me as a new entrepreneur.

In every production operation, skills, experience and motivation of people are considered in terms of communication, work conditions and safety.

Below is the flow chart of the production process

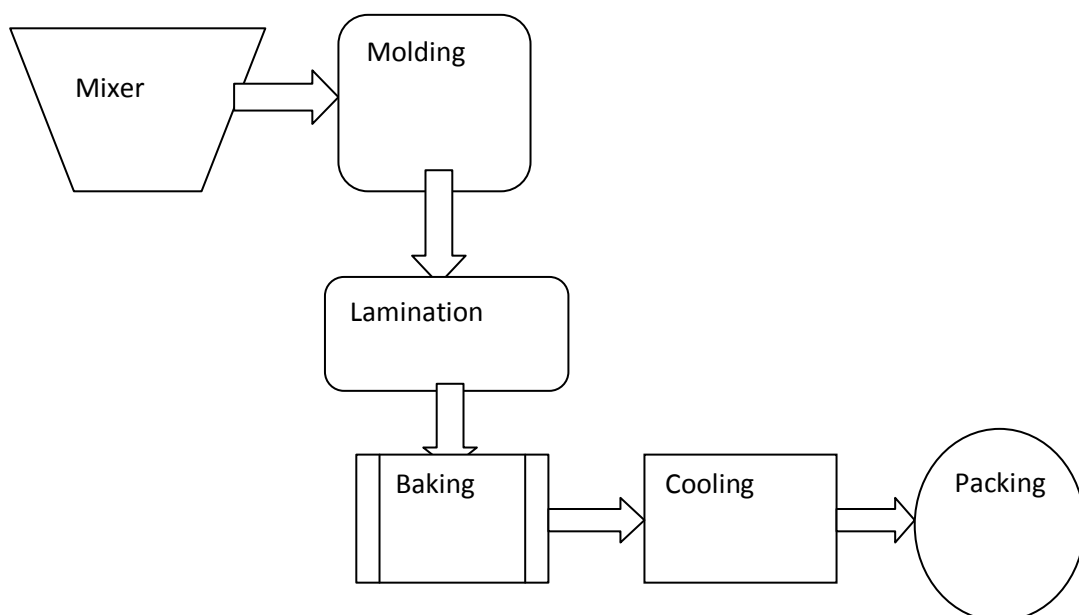


Figure 2. Flow chart of the operation process

1.2.1 Problems Definition

The starting point of the project is this bachelor's thesis which in the future will be partly used as a business plan to ease the process. A good business plan in the background gives some amount of confidence to the authorities, when they issue certificates needed for company's operation, such as an operation permit and sanitary certificates. This is why it is essential to take all important information into account.

There are several constraints for the project, for example the resources, budget and risk. There are also several goals which I will try to achieve in this project. The aim of this project will become reality in the future, because based on this study the real setting up of the company will take place.

I will try to describe the setting up of the company from the point of view of a supply chain. In this way the most important factors arise in terms of difficulties, advantages and solutions by applying logistical knowledge. The approach to the supply chain done in a way to achieve a high efficiency level with minimal resources and costs.

2 SUPPLY CHAIN MANAGEMENT

2.1 Logistics

Logistics includes all the functions that are essential to provide place and time value to a product. This includes all the functions that are necessary to move a product from the point of production to the point of consumption safely and efficiently. Each of these functions may have certain activities associated with it. For instance, purchasing includes supplier selection, ordering processing and order follow up.

The logistics activities such as time, place and source will serve as a link between production and consumption. The operation of the company starts by selecting a reliable supplier to supply raw materials at the right time. After the production process the finished goods are transferred to the finished goods room and then transported to distribution centers, and then to the end consumers. Logistics is one of the key factors in the company and also is treated as a guide.

In many cases logistics plays a major role in business fields. On the basis of my research I think that if you apply logistics to an exact situation, specifying all the facts for it, it is possible to solve any problem. [4]

2.2 Supply Chain

The purpose of supply chain management is to leverage the supply chain to achieve the lowest initial purchase price while assuring supply chain. Typical characteristics include multiple partners, length of negotiations and formal short term contracts.

An important part of a supply chain is the selection of right suppliers. Therefore the rating of suppliers is very important.

Quality, delivery, price and services are the key factors in terms of selecting suppliers and also the location of the suppliers plays an important role in terms of transportation and distribution, also improving on time delivery performance. Customer demand is one of the key factors in today's business, therefore demand must be known in terms of location and the amount of the product. [2]

Figure 3 illustrates the material supply, manufacturing process and then delivery to the end consumers.

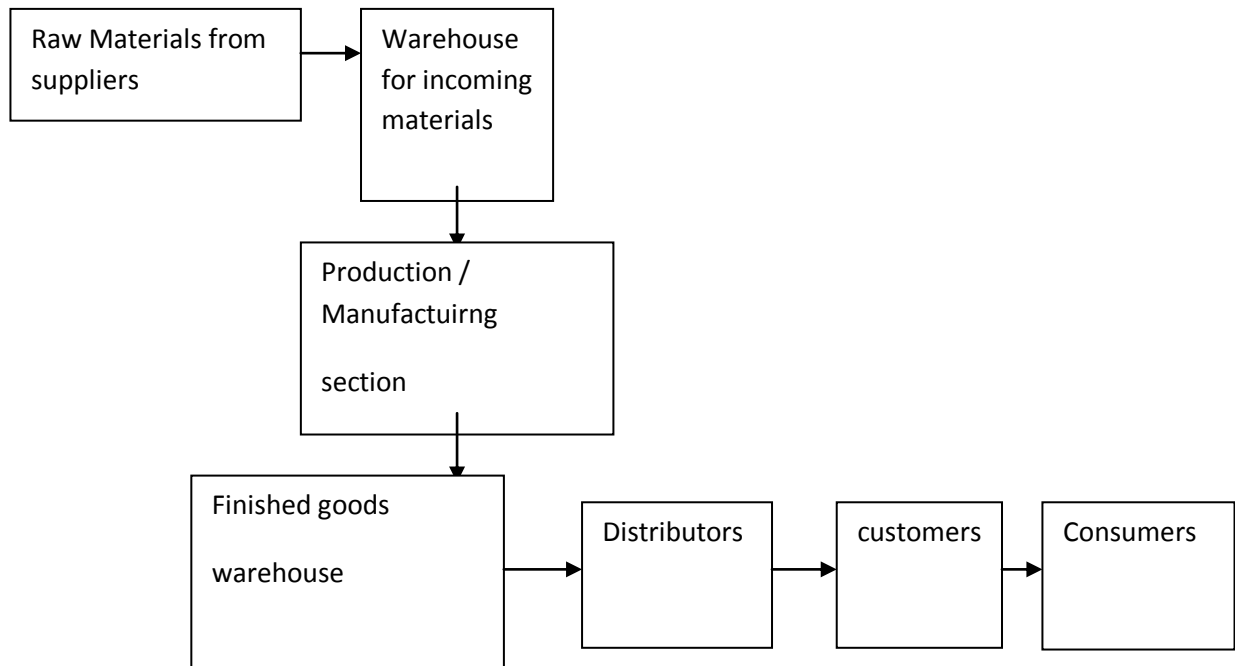


Figure 3 Logistics supply chain

2.3 Production

Production ensures that the customer's requirements are met in terms of quantity, quality and timelines. Selecting suitable materials the colors and tastes determines the appropriate dimensions which will depend on the customer's wishes. Also to ensure of having goods made on time and at reasonable cost.

There is nothing to transport or store, to purchase or distribute and even dispose without production. Good production planning involves the availability of resources and inventory to meet the delivery time and quantity required. Capacity planning will determine the type and help producing the desired product [4]

2.4 Warehousing

The purpose of a warehouse is to store goods at various stages of production, such as raw materials, finished goods and in process inventory. There are goods produced seasonally in large quantities in order to meet the regular demand.

Raw materials are stored before the operation in case of shortage of materials However, storage of raw materials and storage of finished products is very important in today's business.

2.5 Materials Handling

Materials handling is a very important aspect of any manufacturing operation. The purpose is to move raw materials, work-in-process and finished parts to facilitate the overall production operation. The materials handling equipment has to be arranged

correctly in order to move materials through the shortest route and distance and use straight-line movement whenever possible.

The selection of material handling equipment is in vain without considering the storage room. Effective materials handling helps to save and improve the system productivity, which relies heavily on warehouse, manufacturing and distribution [4]

2.6 Packaging

Packaging has a significant impact on the cost and productivity of the logistical system. The role of packaging in inventory helps to improve efficiency in handling and distribution. It protects the goods in the package so that they are not damaged during handling in storage and transportation.

Handling costs depend on unit loading and techniques. Transportation and storage costs are influenced by package size and density. Even though a small company does not have all those activities, packaging is crucial in any case and has to be handled with care even at the lowest stage of production [5]

2.7 Transportation

Transportation provides the link between production, storage and consumption. It has existed as physical transportation and as additional services giving a competitive advantage. The company own vehicle will be used for transporting the raw materials and the finished goods in order to minimize cost. The whole operation will be started by using one car at the beginning and later on about two or three vehicles will be added if the production starts to improve. [4]

2.8 Reverse Logistics

Due to the fact that most of the possibilities to compete on the market are fulfilled, sometimes the reverse logistics can become an option of competitive advantage to provide the customers with another possibility of evaluating the product. Reverse logistics includes product returns, source reduction, recycling, materials substitution, reuse of materials, waste disposal, refurbishing, repair and remanufacturing.

As an activity, program, or process, reverse logistics interfaces with every other functional area within the organization. By integration into other activities, reverse logistics enables the company to save costs. [6]

3 MARKETING OF THE PRODUCT

The product marketing will start in all the four major cities: Takoradi, Kumasi, Accra and Cape coast and marketing will be distributed to the warehouse, which specializes in the low price products for small grocery stores. Knowing the right customer and getting closer to them will help to know their needs and desires.

3.1 Market Analysis

The biggest segment of biscuits market is expensive biscuits, for example in Nigeria “Nasco cookies” and in Ivory Coast “Stauffer” and so on. But the price is high. Most of the locally produced biscuits are all without a filling apart from the imported biscuits. So the plan is to produce biscuits with a filling for a low price.

Marketing biscuits is not functioning well in some parts of the country. There is a market segment in all the cities, but Accra and Kumasi markets are dominated by many international brands. Many international manufactures have a special niche as their products are fresh and they offer many varieties and they are not expensive.

According to my calculations the price of the biscuit is 0.50 GHC. It must be low enough to attract the customers and to get profit. If the prices for raw materials started to grow, then an increase in the price would be necessary. The other costs depend on the operation and are manageable. In addition, according to Ghanaian Statistics there is a strong demand growth driven by the constantly increasing level of income. [1]

3.2 Variety of the Product

To fulfill the market requirement two kinds of biscuits will be produced, crunchy and crispy biscuits with and without the filling. There will be two different types of tastes for the filling. Both with and without filling biscuits will have a triangular shape, to ensure them as having as many differences as possible. The marketed brand name for the biscuit is: Frankie’s Biscuits Ltd.

3.2.1 Products Characteristics

The biscuit will consists of two similar parts with a flavored filling between them (in addition to the taste) including hardness, crunchiness and crispness as perceived by a consumer. Those qualities depend mainly on the compose, the diameter of one part of the biscuits is 5.5 cm and the height of the other piece of the biscuit is 5 mm, the total height of the whole biscuit with the filling is 1.0 cm. The shape will be rectangle.

Types of filling

- strawberry
- vanilla
- cocoa

3.2.2 Marketing

As a new company entering the market, difficulties will arise; marketing of a new product can be a tough process. In this case a successful business plan will be developed, and then it will be focused on the potential customers and how to reach those customers. A good business plan will have details of the customers; the method of contacting the customer will be online, television, newspaper or personal contact.

The main idea of marketing the product will start by adopting the four P's, the components of marketing mix, which are Product, Price, Promotion, and Place. Apart from the product itself there are elements associated with the product that customers may be attracted to. These are as follows: the way it is packaged, the brand name, features quality, design and the size. The pricing approach should reflect the appropriate position of the product in the market and should result in a price that covers the cost per product.

Also knowing what the customers like, dislike, need and want is very important. A platform will be mounted in the market area with a well known musician advertising the product by some of the products will be given out free to the people in the market area to test.

A website will be developed for promoting and advertising the product. Advertising will take place on TV and the radio. There will be people who will visit the communities, schools, organization and many more to advertise the product. On TV there will be a football star from Chelsea (Michael Essien) advertising the product, and of course Essien is well know in Ghana and outside Ghana so this will help in terms of marketing. Also the package of the biscuits will have a design of Essien's picture on the other side to attract customers.

Benchmarking will be used to ensure the best quality of the product as compared to the related product. Therefore the packaging of the product will be designed in order to attract customers. [8]

3.3 Demand

Demand in economics is the desire for product, the ability to pay for it and the willingness to pay. The biscuits to be produced will be priced to suit or fit into the price range of similar biscuits in the market. The consumer must not only be willing

to buy the biscuit, she or he must be able to buy as well. To increase the demand for the product principles of demand are going to be considered.

The law of demand states that if all the other factors remain equal, the higher the price of the goods, the less people will demand the goods. In other words, the higher the price, the lower the quantity demanded. The amount of the items that buyers purchase at a higher price is less because the price of the good goes up. As a result, people will naturally avoid buying a product that will force them to decrease the consumption of something else they value more.

In the case price elasticity of demand will be used to measure the rate of response of quantity demanded due to the price change. For example Figure 4 shows the change in price from 15 euros to 20 euros, this will affect the demand due to the change in price.

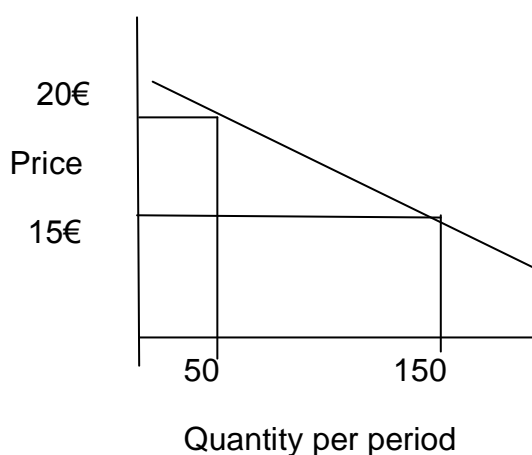


Figure 4. Demand curve.

When the price increases, a substantial drop in demand will occur from 150 to 50. This means that the higher the price, the lower the demand.

On the other hand like the law of demand, the law of supply demonstrates the quantities that will be sold at a certain price. Producers supply more at a lower price because selling a larger quantity at higher price increases the revenue.

When the supply function and demand function intersect, the allocation of goods is at its most efficient level because the amount of goods being supplied is exactly the same as the amount of goods being demanded. At the given price, suppliers are selling all the goods that they have produced and consumers are getting all the goods that they are demanding. [8]

4 FACILITY PLANNING

The facility planning will be carried out by the selection of the best location, depending on the operation. The location can be within the city or outside the city depending on the transportation and how easy and fast it will be. Since the location of the facility plays an important role in minimizing the cost of logistics, then it will be a good idea to take these things into account, including labor cost and insurance.

The layout of the facility is planned based on the production process. In this case the location of the facility layout will be far from the city; moreover, the raw materials can be purchased in the same city where the facility layout will be installed. (Appendix A)

This will be the best advantage for me as a new entrepreneur, also transporting raw materials will not be difficult and the facility also has a direct connection with a highway. [4]

4.1 Layout of the Facility

Layout of the facility is very important in today's business operation in terms of meeting the employee needs and maximizing the effectiveness of a production process. The plan is that the facility layout will be designed so that it can be expanded in the future.

The facility layout will be divided into three parts (Appendix B).

- warehouse department
- production department
- offices department.

All the three sections are important for a new company. Much attention will be paid on the production department because production is the core area. Warehouse department is also important. Without a warehouse there will be no place to store raw materials and finished goods.

4.2 Warehouse Planning

The warehouse will fulfill four main functions: receiving of raw materials, storing of raw materials, storing of finished goods and transporting of finished goods. There will be two warehouses in the supply chain. [4]

4.2.1 Location of Warehouse

The warehouse location will be in the same building in order to make it easy for the production (Figure 5, Appendix C). This must reduce the amount of time and relieve any rush situations.

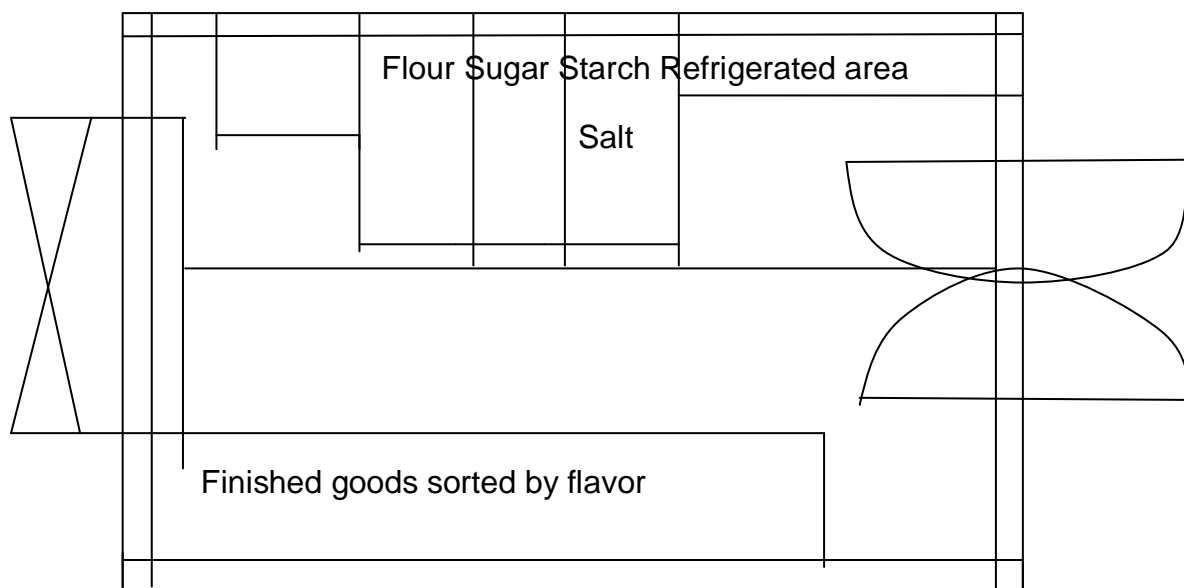


Figure 5. Warehouse layout

4.2.2 Warehouse Layout

The warehouse will function as receiving and storing of raw materials as well as storing and transporting of finished goods. Therefore it will be divided into two parts: incoming goods and raw materials area and outgoing and finished goods area. A successful warehouse does not need a large variety of products and equipment. Warehouse layout will be designed by maximizing the accessibility to the equipment and the protection of them. Also maximizing the use of space, especially the floor space; all items will be organized in order to avoid an alternative storage method and equipment.

Area for Incoming Goods and Storage of Raw materials

The area for incoming goods and raw materials will consist of small shelves for storing the ingredients (powdered eggs, starch and flour). A refrigerator will be provided for sensitive products due to the temperature, for example (margarine), and ingredients like flour, sugar and milk have to be put on a pallet to avoid damage of the ingredients (Figure 2). Usually the raw materials will be delivered each Friday evening and unloaded by the production personnel. [1]

Operation of the Area of Outgoing Goods and Finished Goods

Only loading of boxes with the finished goods will take place in this area. The only rule that has to be followed here is to place each flavor of biscuits on its own pallet. By doing so the transportation of the right product will be much easier in terms of

distribution. The boxes have to be marked with printed labels, and if misplaced it will not be difficult to find a box. The amount of products produced per day or weekly will define the space where the finished goods are stored. The outgoing finished goods have to be marked manually in the warehouse's movement book and later on entered into the bookkeeping software. In the Excel, which gives a perfect opportunity for analysis, all the raw materials and products can be followed and statistics can be made. The loading of the finished goods happens every Monday morning and then the goods will be distributed to all the four cities.

4.3 Production Planning

At its core, production planning represents the beating heart of any manufacturing process. Its purpose is to minimize the production time and costs, efficiently organize the use of resources and maximize the efficiency in the workplace (Appendix D). In that way the most important needs are met, the highest flexibility is achieved and in that way the best outcome is gained with a low investment cost. There is a set of machines needed for production that just suite the exact product. Biscuits with a filling are a flour based product made out of an elastic dough with a high amount of sugar and fat, a high caloric content and low humidity. The shape, which attracts consumers, is ensured by the plasticity of the dough. The technological process of producing cookies with a filling consists of the following stages (Figure 6):

- preparation of loose materials
- mixing of liquid materials
- preparation of filling
- mixing of dough
- forming the dough
- baking
- cooling down
- forming the cookies with a filling
- Packing.

There is the manufacturing equipment needed to be bought for every stage of the production and materials handling equipment to provide the movement of in-process material between the points of activity.

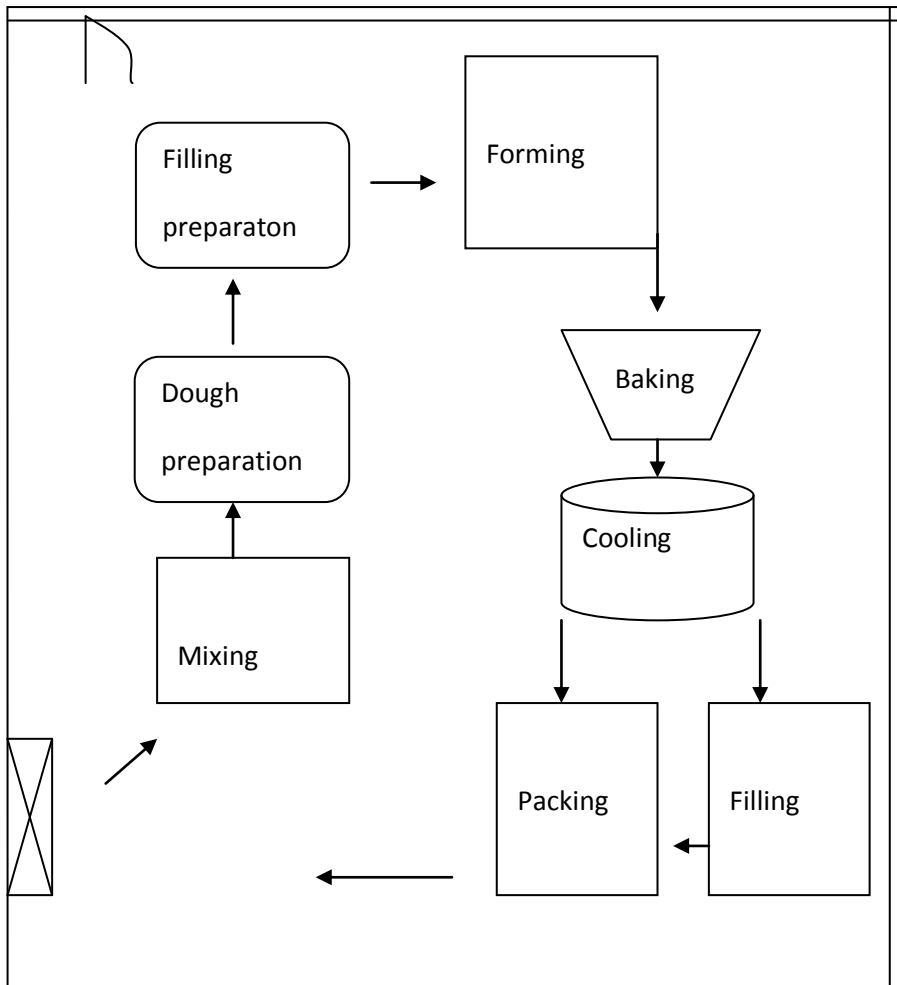


Figure 6 Production Planning

4.3.1 Production Layout

The whole equipment for the production will be contained in one room. As it is shown in the flow chart the raw materials will be brought from the raw materials warehouse part to the preparation units and let pass through the several units:

- liquid materials mixer
- dough mixer
- filling preparation unit
- forming unit
- oven
- Packing.

Finally, the finished products are transferred to the finished goods warehouse part.

4.3.2 Production Capacity

Monthly production capacity is 100 packs and it requires 190 kg of flour, 30 kg of sugar, 19 kg of margarine, 24 kg of milk and about 2 kg of other ingredients like (starch, flavors.)

4.4 Production Equipment

Chinese bakery equipment was chosen because it's affordable and easy to use. In some countries bakery equipment is too expensive, complicated and designed for huge production lines. So the Chinese brands such as "KBL bakery equipment" were selected.

Liquid Materials Mixer

One mixer will be used both for the liquid materials in the dough and filling mixing. Important factors in selecting the mixing equipment are the price and the ease of operation, which includes cleaning, durability, efficiency, long life, reliability and also trouble free operation with a safety guard. This mixer has the ability to operate accurately with a minimum of supervision, which is very useful in my case. It is extremely simple in operation having only two speeds and a turning bucket. [10]



Capacity	5 – 20 L
Speed	200 rpm
Power consumption	0.8 kw/h
Dimensions (L*W*H)	106cm*71cm*150cm
Price	607 GHS

Figure 7 Liquid mixer materials

Dough Mixing Equipment

The dough mixing machine is used for producing a mixture of dough for industrial production of confectionery products from wheat and grades of flour. The type of machine I will use is very simple and fully manually operated.

Reasons why this type of machine was selected is that it's easy to clean, has low capacity. This type of machine is set to mixer for automatic shift from first to second speed or manually controlled. In this way I ensure the smooth running of the production chain and a low investment cost in equipment and low running costs. [10]



Weight of dough	2 – 20 kg
Weight of flour	1 – 15 kg
Amount of Liquid	1 – 10 L
Power consumption	1,35kw/h
Price	1170 GHS

Figure 8 Dough mixing equipment

Filling Preparatory Units

Filling preparation unit is used for the production of all kinds of confectionery fillings with all kinds of flavors. It is a vessel with insulation. It is very important in production, because it helps to achieve the needed 160 – 170 degrees with the lowest possible amount of energy spent and keeps the temperature stable.

It is equipped with a mixing unit which mixes the materials inside the tank while the mixture is being boiled. The capacity of 20 liters gives us the possibility to produce the filling for the whole day and just to hold the needed temperature in the vessel after the filling is ready. Another advantage is the turning bucket, which makes it easier to partly unload the filling. [1]



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Figure 9. Filling Preparation Unit

Capacity	20 L
Power consumption	2kwh

Price 984 GHS

4.4.1 Dough Forming Machine

This type of dough forming machine was chosen due to the specification of the machine. The capacity of the machine is up to 150kg per hour which means this will be enough for this operation and will help to improve the opportunity for growth. It has a small bucket for dough and the main machine has three kinds of specifications and can be chosen according to the requirements needed.

In the future there will also be a programmable logic system dough machine which may automatically adjust the speed of the roller wheel and also form variations to the flavor variety if there is demand on the market. [11]



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Figure 10 Dough Forming Machine

Capacity up to	150kg/h
Power consumption	3.8kwh
Price	1534 GHS

4.4.2 Oven

The oven was chosen according to the easy-of-use and simple operating. This type of oven has only a temperature regulator. The capacity of this machine is 5 steel plates of 500x500mm. An important factor in selecting the oven is uniform baking result; [11]

Power consumption 8.5 kw/h

Price 767 GHS



Figure 11 Oven

4.4.3 Parking unit

The chosen parking unit is a very simple one. The product will be fed into the packaging line from the production line which may automatically adjust the speed and position of the product thus making the product enter into the packaging machine orderly and correctly. If automatically controls the start, stop and the speed of the parking machine. [1]

Power consumption 5kw/h

Throughput 160kg/h

Price 633 GHS



.Figure 12 Parking unit

4.4.4 Raw Materials

Many biscuit companies have several compounds for the production of cookies. But in this case basic ingredients or raw materials will be chosen for the process. The basics raw materials for manufacturing of the biscuits are wheat flour, sugar, milk, margarine and eggs. The flour required for elasticity to ensure the best result. Sugar must be in a powdered form to give the best mixing ability with the other ingredients. Margarine is cheap and easy to get everywhere. Fine salt will be added to give a great taste, though the percentage of it in the total mixture is very small. Eggs are an important component; in mass production powdered eggs are used.

These ingredients give a small advantage to save costs in raw materials as well as in transportation and storage. Milk also has the same application; the percentage of eggs in the mixture is not big and is not a good idea to use powdered eggs and powdered milk. Having powdered milk I will need a large refrigerated storage space and large refrigerators. Starch is the ingredient which adds some plasticity to the finished product, aromatic is an additional ingredient which can be added to produce a different flavor. [1]

4.4.5 Process

Raw materials will be separated from several groups of liquid materials, loose materials and filling materials. The materials must fulfill the medium required standards and technological condition. The production process takes about one hour. The process will consist of all the ingredients in the right proportion for dough formation and after that it will be fed into the mixer; dough is ready for cutting or molding when the mixing is done. [1].

Loose materials

When adding flour to dough in a mixer the flour should not be put once into the mixer. It may happen that the flour flies out to the working environment and a big mess takes place. So the flour with a low and high viscosity is mixed in exact proportion.

In this way the flour will be mixed uniformly and also the speed will be kept low, so that the dough should not be overworked in order to ensure better dough. [1]

Liquid Materials

To get an equal mixture it is very important to have a special design of liquid materials. It is essential to mix the entire ingredients equally. Egg powder, milk powder, starch, soda and water are added to the mixer and mixed for 10 minutes. The required amount of water is added. Then the temperature of the margarine has to be high, about 300 degrees and it must be in a liquid form. It is mixed for another 10 minutes. After that the mixture is taken for cooling down to 25 degrees and left on a heater where it is held at this temperature.

Preparation of Dough

There are two ways of preparing the dough; a periodical and a continuous way. Periodical preparation was chosen because of the size of the production unit and the also the amount of production. In the near future in case of demand growth the transition to a continuous preparation of dough can be considered. It needs more human resources.

The preparation of the dough is a matter of mixing all the required ingredients in the dough mixer. The mixer is started and the liquid is added gradually into the rotating mixer. The mixture is mixed for about 25 to 35 minutes, after which the liquid is put into the mixer. The mixing time depends on the temperature, the type of flour and the speed of the mixer.

Forming of the Dough

In the forming section the dough is passed through several rollers to form a sheet. These sheets are then converted into a uniform sheet of desired thickness which is normally 5-4 mm, molders and cutters are used to cut the sheet or convert the dough into a desired shape and size. Usually there is dough sheet conditioning which is done per ambient in the plant:

Steam spray – to moist the web surface

Blower – to dry the dough surface

Flour dusting – to dry and wet the surface of the dough.

The machine requires two workers to operate it. One is filling the machine with dough and another worker is removing the steel plate or sheet from the conveyor and inserting them into the shelf carriage. After that all the biscuits are formed and the carriages are moved for baking.

Baking

The dough will be cut according to the shapes and size and put into the oven. The heat is transferred to the biscuits by a conductor, convection and radiation. The formed dough is baked for 6 to 7 minutes in the temperature of 240 degrees Celsius. The time may differ and has to be found experimentally.

Cooling

The cooling process is as important as other process. When the biscuits come out from the oven, the temperature of the biscuits is around 70 to 95 degrees Celsius.

These biscuits can be cooled in the cooling area. In this way the baked biscuits will not be deformed. Otherwise the cooling down process will be too fast and the outside part of the cookies will cool down faster than the inside. This will cause deformation in terms of the rising middle part.

Filling

The filling is all about mixing the ingredients (that is fat, sugar, flavorings and hardeners), which prevent the filling from melting in warm conditions in a small enclosed tank.

When the filling is done the syringe is filled with it and it is manually applied to the baked and cool down biscuits. After the cooling a biscuit is put on top of the filling, again. When all the biscuits on the plate are ready, the plate is put on the shelf carriage to let the filling harden. The hardening takes a couple of minutes.

Packaging the Product

Products are fed into the packing machine in stacks. This is achieved through a stacker which converts free flowing biscuits into a uniform stack. After that the package is taken manually and placed into a small carton box pack which is also closed and put into a big cartoon box.

The height of the package is 30 cm including 25 biscuits. The products will be put in a box with the dimensions of 40 cm*40 cm*31 cm. The box contains 25 packages of biscuits with a filling and without a filling. There are 25 packs in a box of the same size. The material of the box is cardboard.

The dimensions of the cartoon boxes depend on the amount of the biscuits packed. So in this case the diameter of the pack is 8 cm and the material is plastic.

Automated and manual packaging technologies will be used. This is an important part of packaging as it relates to storage. Unitizing is needed for grouping of product pack in one unit load for materials handling and transport. The pallet will contain only 18 boxes, this means 3 rows (Figure 13 cartoon box). There will be a risk if the number of rows is bigger and it will also damage the product.

Finally, the pallet is transferred to the warehouse. The pallet is only an internal transportation unit. All the outside transportation is done in boxes

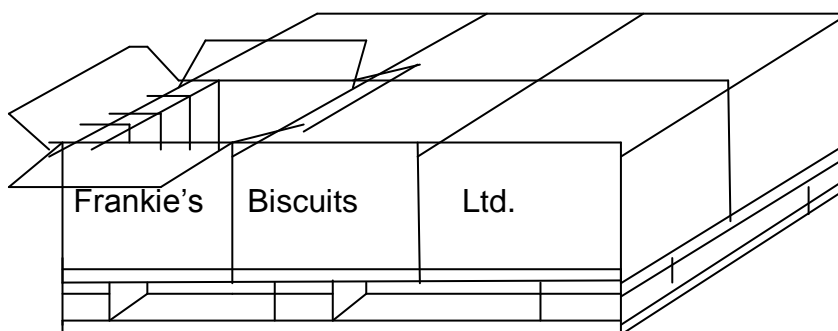


Figure 13. A cartoon box.

4.6 Labor

The production cycle will take about two hours. Labor requirement is as follows:

Table 1 Labor requirement.

Particulars	No
Workers	3

The city is full of unemployment, so there will not be any problems to find the needed personnel. Workers will have some individual tasks and some tasks, which they have to perform together.

Table 2 Production process

Tasks	Time tracking	No of workers
Liquid mixing	10 min	1 st person
Dough mixing	20 min	1 st person
Preparation of Filling	25 min	2 nd person
Forming	20 min	Both
Baking	10 min	Both
Cooling	15 min	1 st person
Packing	20 min	Both

The seven cycles are to be performed daily, depending on the market situation. I can cut or increase the number of cycles. There is a lunch break after three cycles.

5 INVENTORY PLANNING

Maintaining the appropriate level of inventory helps an organization to achieve several important functions. One of the important functions of an inventory is to meet the uncertainties in production and supply in terms of time, place, variety and quantity. [4]

According to the production plan there will be about 25 boxes produced in every week and all of them must leave the warehouse on Monday morning for delivery. This means that the inventory will not be very large. There will be one week's production in the inventory of both raw materials and finished goods all together.

In the small production company it is extremely important to have as small an inventory as possible and the most essential thing is that my company will not produce more than we can sell.

In this way the inventory costs will be as low as possible, this ensures low inventory costs and less money invested in raw materials. The working day will be cut by a needed amount of time so that the supply over demand will not be exceeded.

6 TRANSPORTATION PLANNING

All the necessary transportation will be done by the company's own truck, because it is the most comfortable and cheapest way for a small company. The most important factors are flexibility and costs.

6.1 Distribution

The distribution channels are within the four cities in the beginning; the transportation will have a form of going through the four major cities. There are several warehouses in each city and the transportation will be organized in the way that all the products for delivery are loaded in the truck early on Monday morning and unloaded around the western part of Ghana. The last city for unloading the same one where I will load the packing material and return to Accra.

The overall transportation distance is around 500 km. Some raw materials which are not available in Accra city are purchased in the last city of delivery. After the last delivery is done, the truck has to return to the factory.

6.2 Purchasing

Purchasing includes all the activities that have to be carried out in order to ensure the availability of materials on time. So in this case food production materials and packaging materials are the two types of raw materials which will be purchased. Both food and packaging materials will be purchased from a city warehouse, because there are several of them in the city.

The price variation in the warehouse is mostly due to different transportation costs, depending on the turnover of the warehouse and the possibility of transportation. The quality of goods received from vendors and the timelines of supply have a significant impact on the ability of the company to meet the demands of its customers. [4]

The packaging of raw materials will be a little bit complex. The carton boxes and packing the biscuits will be supplied by the same vendor who is supplying the food materials. The small printed biscuits boxes have to be ordered from a printing house and transported by the company's own van. In this case it will be best for me to have a private printing house so that the transportation costs will remain low.

The printing house I selected is located in Kumasi which is not far away from Accra. The pricing is very reasonable. Unfortunately there was no large variety and possibility to choose a printing house, because the big ones are not interested in this small amount and only a few of them are situated in the western part of Ghana.

7 ANALYSIS OF MATERIAL HANDLING EQUIPMENT AND TYPES

Material Handling is an important aspect of any manufacturing operation and it facilitates the overall production operation. As a small company, materials handling will be simple and involve only two pieces of variable equipment: a hand pallet truck (Figure 14) and a shelf carriage (Figure15).

The handling activities will include receiving and production. Handling must be performed in a safe, efficient, accurate and timely manner. The only way to load and unload the raw materials and finished goods when the raw materials arrive or leave the warehouse is by using a hand pallet truck and a shelf carriage.

This is due to a large number of pieces and a very small size. The number of equipment needed is two hand pallet trucks and three shelf carriages.

The carriage will be determined according to the amount of products handled. There are three points in the production line where the carriage is needed after the forming of the dough, cooling and packing, so three carriages are needed.



Figure 14 Hand pallet truck, Price 255 GHS



Figure 15 This equipment is suitable for indoor transportation of a large amount of steel plates.

8 CERTIFICATES

Two certificates will be needed for this organization. One is the general operation certificate and the other one is hygiene certificate, which is only purposed for food industries.

Several inspections will be done before a hygiene certificate is given. That includes condition of facility, water analysis, availability and sources of water and sewage and room location.

9 FINANCIAL PLANNING

In any company or organization financial planning is very important and it is even more essential for a new company, because the actual figures are not known and therefore estimations must be very precise. [3]

Several costs arise which includes investment: rent building, water and electricity, raw materials, salary, social responsibilities and transportation costs (Appendix E).

Table 3 investment costs:

Liquid mixing machine	607 GHS
Dough mixing machine	1170 GHS
Filling preparatory unit	984 GHS
Dough forming machine	1534 GHS
Pallet truck	255 GHS
Oven	767 GHS
Packing machine	633 GHS
3 Carriages	73 GHS
Total	6033 GHS
Payback period	60 months
Monthly payback	100 GHS

It is planned to return the investment in 5 years, meaning that every month there will be 100 GHS assigned to the return of investment and pay out at the end of the year.

The monthly costs of water, building and electricity are 178 GHS.

Raw materials costs:

The plan is to produce 25 boxes of biscuits per week, in this case the needed amount of dough is around 270 kg, which consists of 190 kg of flour, 30 kg of sugar, 19 kg of margarine, 24 kg of milk and about 2 kg of flavor and other ingredients. The prices of all the ingredients per kilogram are:

Flour 0.26 GHS per kg

Sugar 0.26 GHS per kg

Margarine 0.45 GHS per kg

Milk 0.13 GHS per liters

Other ingredients 1.59 GHS per kg

The packing materials will cost 77 GHS per month. This gives 89 GHS of weekly raw material cost, which gives 385 GHS per month.

Transportation costs are 25.5 GHS per trip, meaning 111 GHS per month which include truck rent with fuel.

Table 4 Salary and social responsibilities costs:

Salary (3 workers)	332 GHS
Social responsibilities	110 GHS
Total	442 GHS

Management salary will be paid out as a dividend

In a week 25 boxes of biscuits will be produced, which gives 100 packs per month, at the price of 13.2936 GHS per box. In this case the revenue will be 1329 GHS. 25 boxes of biscuits will be produced, 10 packages of biscuits with filling and 15 packages of biscuits without a filling. Meaning 40 packages of biscuits with a filling and 60 packages of biscuits without a filling will be produced in a month.

The price of a pack of filled biscuits is 1.33 GHS and 0.89 GHS for biscuits without a filling. This means that the sales of both biscuits will be 8.88 GHS per month. The break-even point in GHS/month is 0.75 GHS/month; the total costs will be 1066 GHS per month.

The fixed costs consist of rent, building, electricity, water, transportation, and salary costs. Because no matter how I produce I still have to make one trip per week. The account for the fixed costs is 731 GHS per month

The variable costs consist of only raw materials and the estimated account for the variable costs is 358 GHS. Variable costs are lower than the fixed costs simply because I will produce as much as I need. I will plan to improve the output in the future, the machines have the needed capacity to increase the capacity several times, the only factor I have to take into consideration is demand.

Usually there is more production than what is sold which causes major imbalance in the company's financial situation. If there is a bad situation and a lot of unsold products, then I have to slow down the production. In this way I will have fewer costs and less financial resources tied in the warehouse.

Bookkeeping

Bookkeeping is very important in all companies, either big or small company. The main advantage of bookkeeping is that not only will it save the expenses of an accountant, but it can help to keep track of what the company is doing during operation.

Bookkeeping monitors the movement of all the expenses in and out. In this way is easier to know how much money the company is earning and how much money is flowing out. So it is very essential for the company to check its bank transactions monthly due to some errors. [7]

Basically the things which will be checked and booked down daily, weekly, and monthly are the following:

Costs of sales

Employee costs

Maintenance

Administrative expenses

Travel expenses

Vehicle expenses

Advertising

Bookkeeping will be handled by the General Manager, who is also taking care of the overall operation. In this way in addition to transportation, about two days at the end of each month will be needed to take care of all the bookkeeping.

10 REVERSE LOGISTICS

In today's market place, reverse logistics is a very important factor in the supply chain. In certain industries products are distributed to consumers in the supply chain and the products may be returned if they are not sold. At the moment there is no certain demand for the products in Ghana. In this case the packaging materials which are used are recyclable and will fulfill several standards.

The limitation costs will be minimizing as much as possible by focusing more on reverse logistics. In the future the growth of production and reverse logistics will become an integral part of the company. [6]

11 CONCLUSIONS

The main goal of the company is to successfully enter the market and be able to sell the amount of products produced. Also increasing the production level from 200 kilograms to 500 kilogram/per week and moving from a rented facility to a company's own building when there will be need for additional space are aimed at.

This research shows that the project is feasible and can be carried out without any problems if approached with caution and if ways are sought to achieve competitive advantage. The main competitive advantage for entering Ghanaian market is low price, compared to other competitors. This is achieved by transportation cost, efficient planning and low investments.

A new product will be developed if everything goes more or less as it is planned, some new investment and expansion may take place. More attention will be paid on the financial and operational risk due to the challenging economic environment. I will also try to manage the risk by integrated platform approach with a strong connection between the managers and compliance officers.

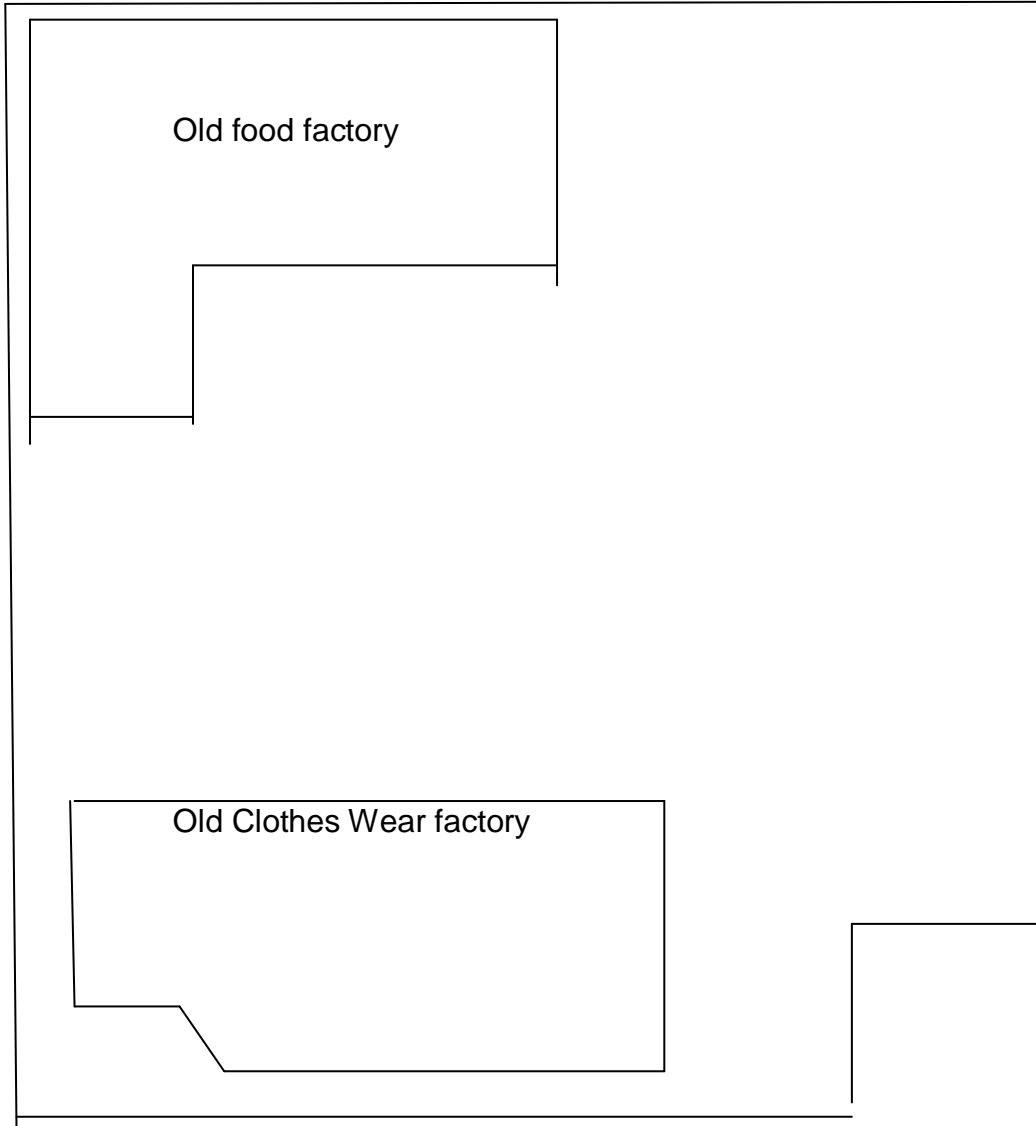
REFERENCES

1. Adom Fofro Biscuits Limited Ghana (Mr. Francis Kwatia, General Manager, (interviewed 10th September 2010),
2. Spekman, R. 1998, An Empirical Investigation into Supply Chain Management. 3rd edition. RE, Spekman. Virginia.
3. Stock, J & Lambert, D. 2001, Strategic Logistics Management. 4th edition. McGraw-Hill. NY.
4. Raga G. 1999. Logistics and Transportation, Designing – Planning. 1ST edition. Kasilingam. Canada.
5. Robeson, F. & Copacino, C. 1994. The Logistics Handbook. 3rd edition. Free Press. NY.
6. Stock, J. 2001. Reverse logistics in the Supply Chain. McGraw-Hill. NY.
7. Hedges, R. 2006. Bookkeeping-made easy. 2rd edition. Law pack. London
8. Kotler, Philip. 2000, Marketing Management. 12th edition. Kotler. New Jersey
9. <http://www.statsghana.gov.gh> Retrieved 16 June 2001
<http://www.kbi.com.tw> Retrieved 18 November 1998

APPENDICES

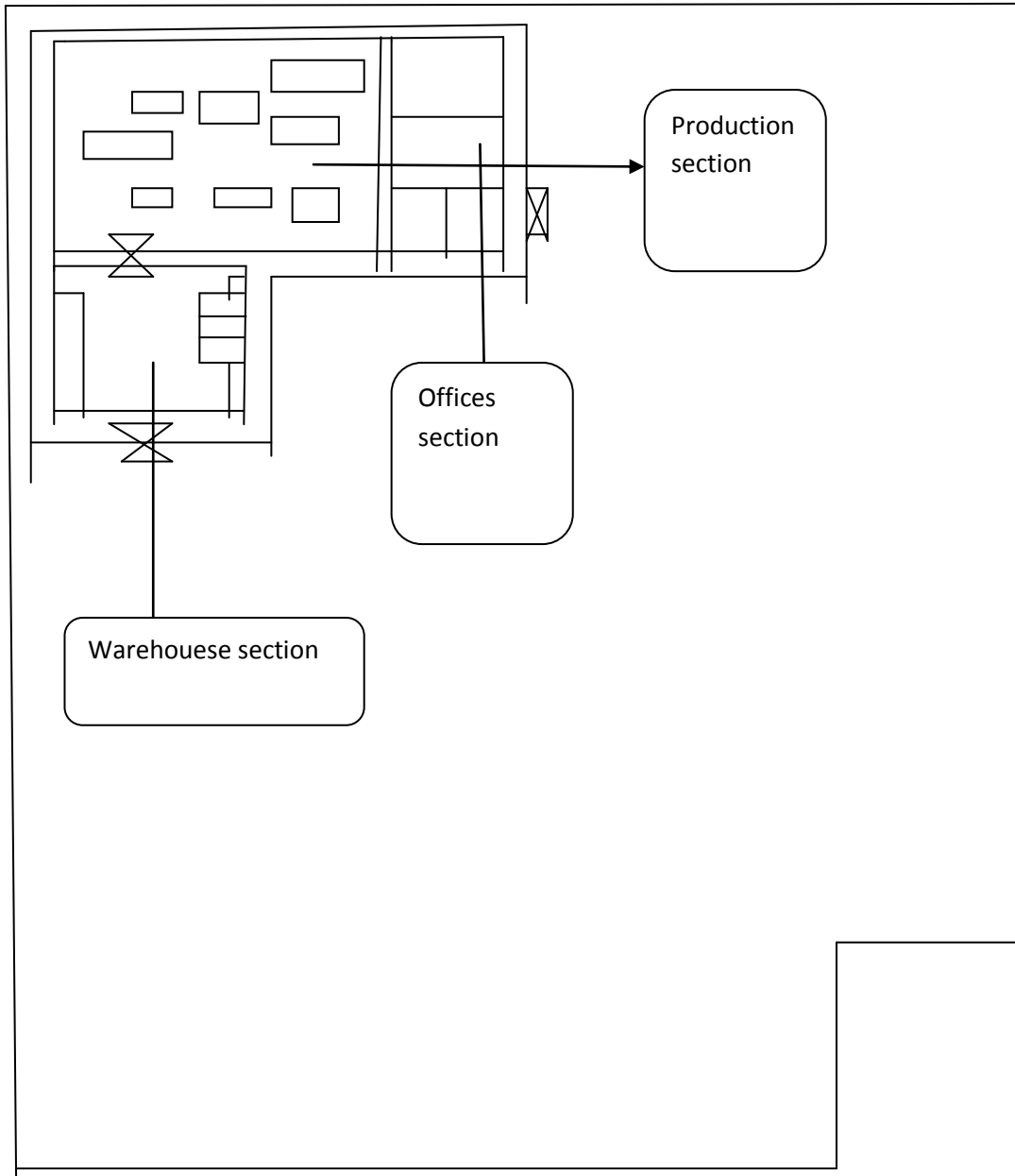
Appendix A	Layout of the Building
Appendix B	The Facility Layout
Appendix C	Layout of the Warehouse
Appendix D	Layout of Production
Appendix E	Costs and Investment Calculations

Appendix A

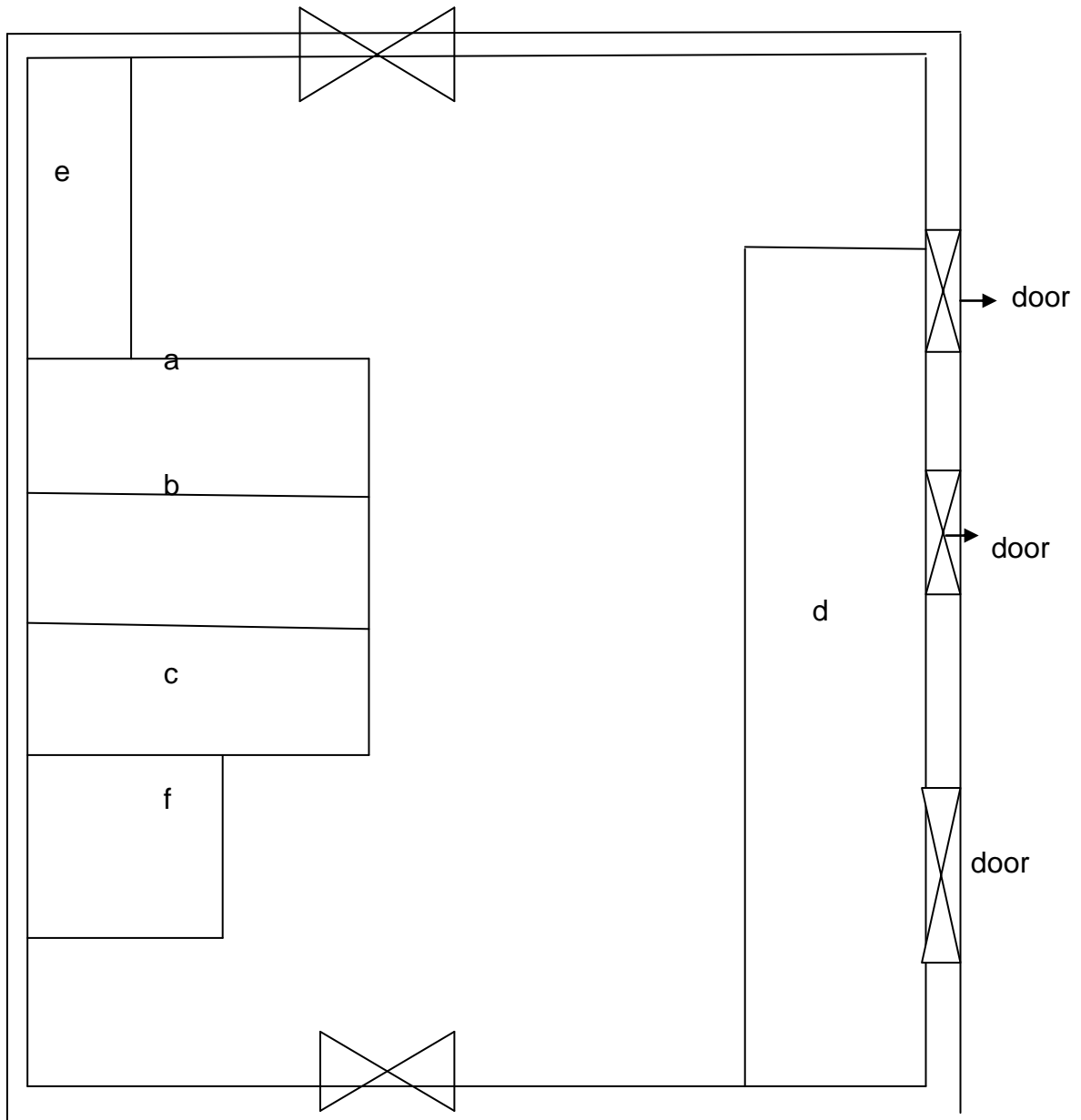


Layout of the building

Appendices B and D



Production and Warehouse Facility layout

Appendix C

Layout of the Warehouse

- a) Flavors, starch, salt
- b) Sugar
- c) Flour
- d) Finished goods sorted by flavor
- e) Refrigeration area 1

f) Refrigeration area 2

Costs and Investment Calculations

Running costs per month	
Rent	178.82 GHS
Raw materials	
Flour	48.57 GHS
Sugar	7.86 GHS
Margarine	8.50 GHS
Milk	3.07 GHS
Other	3.20 GHS
	71.2 GHS
Packing materials	76.69 GHS
Total raw materials	385.22 GHS
Transportation costs	110.78 GHS
Salary and Social costs	442.01 GHS
TOTAL COSTS	1115.83 GHS
Revenue	1329.36 GHS
Profit	<u>213.53 GHS</u>
Equity (bank loan)	2000.00 GHS

Break-even point calculation

Sales/month 1329.36 GHS

Total variable costs/month 358.22 GHS

Contribution margin ratio	73, 05%
Total fixed costs/month	731.00 GHS
Break-even point/GHS =	<u>1000, 64 GHS</u>