THE EFFECTS OF RAW MATERIAL INPUTS ON PRODUCT QUALITY IN A MANUFACTURING FIRM. CASE STUDY (NILE BREWERIESS LIMITED)

BY

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A RESEARCH REPORT SUBMITTED TO THE COLLEGE OF APPLIED ECONOMICS AND MANAGEMENT SCIENCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A BACHELORS DEGREE IN SUPPLIES AND PROCUREMENT MANAGEMENT OF KAMPALA INTERNATIONAL UNIVERSITY

SEPTEMBER, 2012

DECLARATION

I, Owera Sam hereby declare that the work presented in this report is original work and that no study of the kind has been submitted for award of the degree in any University as a whole or in part.

Signature .....

OWERA SAM

Researcher

Date

...18/09/2012.....

APPROVAL

This research report has been prepared under my supervision and submitted to the college of economics and management sciences with my approval.

Signature .....

MR. BARASA HENRY

Supervisor

Date 18/9/2012

DEDICATION

I dedicate this research report to my father Maj. Oyukutu Odwong Peter Okite who worked tirelessly towards my academic success.

This wonderful piece of work is also dedicated to my sister Alum Catherine for her awesome support spiritually through prayers, encouragement when things would seem to be tough.

I would also like to dedicate this work to all those who gave me courage while at the university not forgetting the staff of Kampala International University especially those in the college of applied economics and management science.

ACKNOWLEDGEMENTS

I owe great thanks to my family members and especially my father for the moral, spiritual and financial support given to me.

Am grateful to my supervisor Mr. Barasa Henry for the support he offered me during the period of study and report writing.

With pleasure I acknowledge the support from my dear friends particularly Mr. Patrick Jerem Obara and Mr. Okuba Denish for their inspiration and encouragement to read hard.

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ABSTRACT

This study was carried out to assess the effects of raw materials inputs on product quality in manufacturing industries.

Data was collected through the use of questionnaires accompanied by observation and interviews. The study involved 20 respondents. These were all involved in different activities at different departments.

It was revealed that there is a close relationship between Raw material inputs on product quality factors such as moisture content of grains, hardness of grains, broken or whole grains had an effect on the alcohol content of the beer, it's taste and aroma.

The results indicate that there is need to incorporate new measures of determining quality of the raw materials like ascertaining the scent or smell of the raw materials in addition to observing moistre content, hardness and whole or brokenness of the grains.

Finally recommendations were made like: initiating outgrawers of some raw materials like sorghum to ensure standard and easy accessibility of raw materials, incorporating scent or smell of the grains to ascertain the quality of the Raw materials.

CHAPTER ONE

INTRODUTION

1.0 Background of the Study

Manufacturing industries are those which gather Raw materials, process them into finished and semi finished products. The resulting quality of the finished product is highly dependent on the various factors which include:

Quality of the Raw materials used (the higher the Raw material quality, the higher the product quality).

Quality of manufacturing process (the higher technology and efficiency of manufacturing equipment, the higher the quality of final product).

Skill and motivation of workers(the greater the skill base and motivation of employees, the higher the quality of the final product). To mention but a few.

The main focus of this research is on the effect of Raw material inputs on the quality of the final product.

Raw materials are the initial inputs that undergo the manufacturing process and result into finishes and semi finished products.

Raw materials refer to unprocessed ingredients or materials that undergo the production process and result into the final product.

Professor Juran defines quality as the fitness for purpose. And stresses that quality can only have meaning when viewed from the customers' point of view. This implies that the good should be in position to fulfill or satisfy the purpose or desire that it is designed for.

Professor Cresby states that quality defines quality as the conformity to requirements.

In Nile breweries limited the main raw materials include Malt, Barley, Hops, Rice, corn, Water, Brewers' Yeast

1.2 Problem Statement

As a result of competition in the brewing sector, breweries are interested in improving on the quality of their beers. The research therefore intends to investigate the effects of Raw material inputs on product quality specifically in Nile Breweries limited which is located in Jinja district an industrial town located 30 miles East of Kampala.

1.3 Purpose of the Study

The purpose of the study is to investigate the effect of Raw material inputs on product quality.

1.4 Objectives of the Study

1.4.1 Specific Objectives of the Study

- To establish the effect of Raw material inputs on product quality.
- To determine the relationship between Raw material inputs and product quality.

1.5 Research Questions

- What is the effect of Raw material inputs on the final product?
- What is the relationship between Raw material inputs and product quality?

1.6 Significance of the Study

The research will be useful to Nile Breweries Uganda limited in promoting better Raw materials for better quality products.

The research will form a basis of further research on the effect of Raw materials input on product quality.

The research will be significant for the award of a bachelor's degree in supplies and procurement management.

To other student in the same field it will help them understand the research process and data collection methods.

1.7 Scope of the Study

1.7.1 Geographical Scope

The research will be carried out in Jinja town about 30 miles East of Kampala in Nile breweries limited.

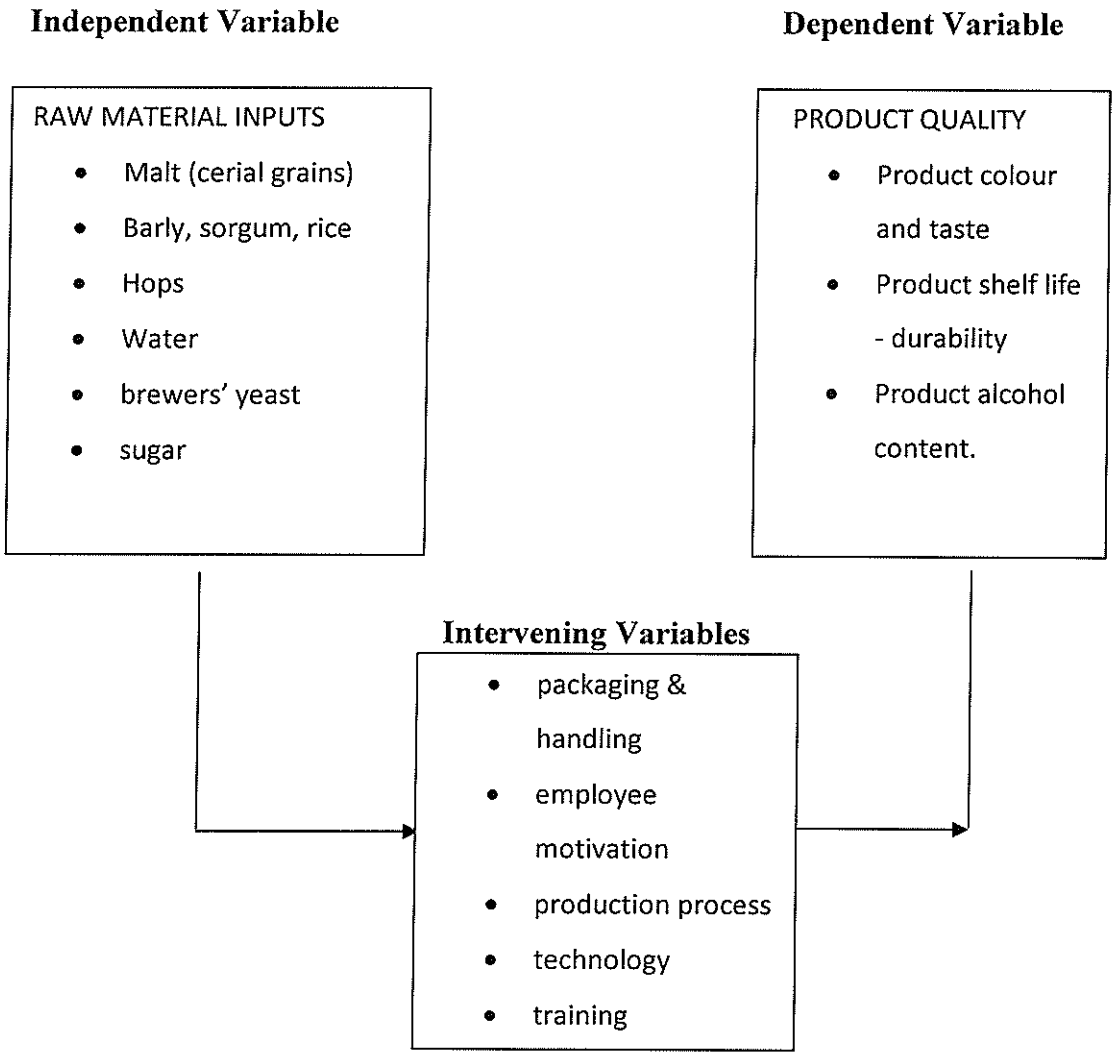
1.7.2 Content scope

The research will be focusing on the Raw materials inventory, work in progress inventory and finished goods inventory.

1.7.3 Time Scope

The study will be conducted between May 2012 and November 2012.

1.8 Conceptual Framework



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter analyses the literature existing on the effect of Raw materials inputs on product quality.

2.1 Definition of Concepts

Raw materials refer to unprocessed ingredients or materials that undergo the production process and result into the final product.

In beer production raw materials include malted grain, depending on the region traditionally barley, wheat or sometimes rye. In Nile Breweries limited Uganda, the raw materials also constitute of sorghum, in addition to the traditional Barley, Wheat and Rye.

All beers are brewed using a process based on a formula. Key to the beer making process is malted grain, depending on the region traditionally barley, wheat or sometimes rye.

Malt is made by allowing a grain to germinate, after which it is then dried in a kiln and sometimes roasted. The germination process creates a number of enzymes, notably alfa-amylase and beta-amylase, which will be used to convert the starch in the grain into sugar. Depending on the amount of roasting, the malt will take on dark colour and strongly influence the colour and flavor of the beer. Breweries buy malt and this is not a process that is done in-house. (John Palmer - Mashing Defined").

The malt is crushed in a malt mill to break apart the grain kernels, increase their surface area, and separate the smaller pieces from the husks. The resulting grist is mixed with heated water in a vat called a "mash tun" for a process known as "mashing". During this process, natural enzymes within the malt break down much of the starch into sugars which play a vital part in the fermentation process. Mashing usually takes 1 to 2 hours, and during this time various temperature rests (waiting periods) activate different enzymes depending upon the type of malt

being used, its modification level, and the desires of the brewmaster. The activity of these enzymes converts the starches of the grains to dextrines and then to fermentable sugars such as maltose.

Cresby defines quality as conformity to requirements, not goodness. He also stresses that the definition of quality can never make any sense unless it is on what the customer wants.

Quality therefore as far as beer is concerned is determined by the attributes of colour, aroma alcoholic content, bitterness carbonation and preservation or product life as related to the beer in question.

Colour, darker beers commonly are more alcoholic and even bitterer and take longer in the fermentation process and are commonly known as pilsners where as other Lagers that are less darker are often of less bitterness and lesser alcoholic content.

2.2 Effect of Raw material inputs on product quality

The brewing industry has become more and more competitive in recent times and players like SAB millers under which Nile Breweries is affiliated must strive to ensure achievement of customer loyalty. This can only be done by production of high quality beers as compared to their competitors in the market like Bell breweries and others.

The quality of the final beer is greatly dependent on the state and quality of the Raw materials involved in the production procedures of the beer in question.

2.2.1 The Brewing Process

Work in the brewery is typically divided into 7 steps: Mashing, Lautering, Boiling, Fermenting, Conditioning, Filtering, and Filling.

2.2.2 Mashing

Mashing is the process of mixing milled grain (typically malted grain) with water, and heating this mixture up with rests at certain temperatures to allow enzymes in the malt to break down the starch in the grain into sugars, typically maltose.

2.2.3 Lautering

Lautering is the separation of the extracts won during mashing from the spent grain. It is achieved in either a lauter tun, a wide vessel with a false bottom, or a mash filter, a plate-and-frame filter designed for this kind of separation. Lautering has two stages: first wort run-off, during which the extract is separated in an undiluted state from the spent grains, and sparging, in which extract which remains with the grains is rinsed off with hot water.

2.2.4 Lauter tun

A lauter tun is the traditional vessel used for separation of the extracted wort. While the basic principle of its operation has remained the same since its first use, technological advances have led to better designed lauter tuns capable of quicker and more complete extraction of the sugars from the grain.

The false bottom in a lauter tun has thin slits to hold back the solids and allow liquids to pass through. The solids, not the false bottom, form a filtration medium and hold back small solids, allowing the otherwise cloudy mash to run out of the lauter tun as a clear liquid. The false bottom of a lauter tun is today made of wedge wire, which can provide a free-flow surface in the bottom of the tun.

In the past the run-off tubes flowed through swan-neck valves into a wort collection grant. While visually stunning, this system led to a lot of oxygen uptake. Such a system has mostly been replaced either by a central wort-collection vessel or the arrangement of outlet ports into concentric zones, with each zone having a ring-shaped collection pipe. Brewhouses in plain public view, particularly those in brewpubs, often maintain the swan-neck valves and grant for their visual effect.

A quality lauter tun has rotating rake arms with a central drive unit. Depending on the size of the lauter tun, there can be between two and six rake arms. Cutting blades hang from these arms. The blade is usually wavy and has a plough-like foot. Each blade has its own path around the tun and often the whole rake assembly can be raised and lowered. Attached to each of these arms is a flap which can be raised and lowered for pushing the spend grains out of the tun. The brewer, or better yet an automated system, can raise and lower the rake arms depending on the turbidity (cloudiness) of the run-off, and the tightness of the grain bed, as measured by the pressure difference between the top and bottom of the grain bed.

A system will introducing sparge water into the lauter tun. Most systems have a ring of spray heads that insure an even and gentle introduction of the sparge water. The watering system should not beat down on the grain bed and form a channel.

Large breweries have self-closing inlets on the bottom of the tun through which the mash is transferred to the lauter tun, and one outlet, also on the bottom of the tun, into which the spent grains fall after lautering is complete. Craft breweries often have manways on the side of the mash tun for spent grain removal, which then must be helped along to a large extent by the brewer.

Some small breweries use a combination mash/lauter tun, in which the rake system cannot be implemented because the mixing mechanism for mashing is of higher importance. The stirring blades can be used as an ersatz rake, but typically they cannot be moved up and down, and would disturb the bed too much were they used deep in the grain bed.

2.2.5 Mash Filter

A mash filter is a plate-and-frame filter. The empty frames contain the mash, including the spent grains, and have a capacity of around one hectoliter. The plates contain a support structure for the filter cloth The plates, frames, and filter cloths are arranged in a carrier frame like so: frame, cloth, plate, cloth, with plates at each end of the structure. Newer mash filters have bladders that can press the liquid out of the grains between spargings. The grain does not act like a filtration medium in a mash filter.

2.2.6 Boiling

Boiling the won extracts, called wort, ensures its sterility, and thus prevents a lot of infections. During the boil hops are added, which contribute bitterness, flavor, and aroma compounds to the beer, and, along with the heat of the boil, causes proteins in the wort to coagulate and the pH of the wort to fall. Finally, the vapors produced during the boil volatilize off flavors, including dimethyl sulfide precursors.

The boil must be conducted so that is it even and intense. The boil lasts between 50 and 120 minutes, depending on its intensity, the hop addition schedule, and volume of wort the brewer expects to evaporate.

2.2.7 Boiling equipment

Simplest boil kettles are direct-fired, with a burner underneath but are also apt to scorch the wort where the flame touches the kettle, causing caramelization and making clean up difficult. SBM does not produce direct-fired kettles but only steam heated kettles.

Most breweries use a steam-fired kettle, which uses steam jackets in the kettle to boil the wort. The steam is delivered under pressure by an external boiler.

Some breweries have a boiling unit outside of the kettle, sometimes called a calandria, through which wort is pumped. The unit is usually a tall, thin cylinder, with many tubes upward through it. These tubes provide an enormous surface area on which vapor bubbles can nucleate, and thus provides for excellent volatization. The total volume of wort is circulated seven to twelve times an hour through this external boiler, insuring that the wort is evenly boiled by the end of the boil. The wort is then boiled in the kettle at atmospheric pressure, and through careful control the inlets and outlets on the external boiler, an overpressure can be achieve in the external boiler, raising the boiling point a few Celsius degrees. Upon return to the boil kettle, a vigorous vaporization occurs. The higher temperature due to increased vaporization can reduce boil times up to 30%. External boilers were originally designed to improve performance of kettles which did not provide adequate boiling effect, but have since been adopted by the industry as a sole means of boiling wort.

Modern brewhouses can also be equipped with internal calandria, which requires no pump. It works on basically the same principle as external units, but relies on convection to move wort through the boiler. This can prevent overboiling, as a deflector above the boiler reduces foaming, and also reduces evaporation. Internal calandria are generally difficult to clean.

2.2.8 Energy Recovery

Boiling wort takes a lot of energy, and it is wasteful to let this energy escape into the atmosphere. To recover this energy is with a kettle vapor condenser (German: Pfaduko, from the much longer Pfannendunstkondensator). A kettle vapor condenser is often nothing more than a plate heat exchanger.

2.2.9 Whirlpool

At the end of the boil, the wort is set into a whirlpool. The so-called teacup effect forces the more dense solids (coagulated proteins, vegetable matter from hops) into a cone in the center of the whirlpool tank.

In most large breweries, there is a separate tank for whirlpooling. These tanks have a large diameter to encourage settling, a flat bottom, a tangential inlet near the bottom of the whirlpool, and an outlet on the bottom near the outer edge of the whirlpool. A whirlpool should have no internal protrusions that might slow down the rotation of the liquid. The bottom of the whirlpool is often slightly sloped toward the outlet. Newer whirlpools often have "Denk rings" suspended in the middle of the whirlpool. These rings are aligned horizontally and have about 75% of the diameter of the whirlpool. The Denk rings prevent the formation of secondary eddies in the whirlpool, encouraging the formation of a cohesive trub cone in the middle of the whirlpool. Smaller breweries often use the brewkettle as a whirlpool.

A better alternative to a whirlpool are hop filters. Hops are removed from the bitter wort using stainless steel filters. The main advantages of his system are better hop filtrations, lower equipment cost and less floor surface.

2.2.10 Wort cooling

After the hop filtration, the wort must be brought down to fermentation temperatures before yeast is added. In modern breweries this is achieved through a plate heat exchanger. A plate heat exchanger has many ridged plates, which form two separate paths. The wort is pumped into the heat exchanger, and goes through every other gap between the plates. The cooling medium, usually water, goes through the other gaps. The ridges in the plates ensure turbulent flow. A good heat exchanger can drop 95 °C wort to 20 °C while warming the cooling medium from about 10 °C to 80 °C. The last few plates often use a cooling medium which can be cooled to below the freezing point, which allows a finer control over the wort-out temperature, and also enables cooling to around 10 °C. After cooling, oxygen is often dissolved into the wort to revitalize the yeast and aid its reproduction.

2.3 Fermenting

Modern Fermenting Tanks

Fermentation, as a step in the brewing process, starts as soon as yeast is added to the cooled wort. This is also the point at which the product is first called beer. It is during this stage that sugars won from the malt are metabolized into alcohol and carbon dioxide. Fermentation tanks come in all sorts of forms, from enormous tanks which can look like storage silos, to five gallon glass carboys in a homebrewer's closet.

Most breweries today use cylindroconical tanks, or CCTs, have a conical bottom and a cylindrical top. The cone's aperture is typically 60°, an angle that will allow the yeast to flow toward the cones apex, but is not so steep as to take up too much vertical space. CCTs can handle both fermenting and conditioning in the same tank. At the end of fermentation, the yeast and other solids which have fallen to the cones apex can be simply flushed out a port at the apex.

Open fermentation vessels are also used, often for show in brewpubs, and in Europe in wheat beer fermentation. These vessels have no tops, which makes harvesting top fermenting yeasts easy but the open tops of the vessels make the risk of infection a lot greater.

Fermentation tanks are typically made of stainless steel. If they are simple cylindrical tanks with beveled ends, they are arranged vertically, as opposed to conditioning tanks which are usually laid out horizontally.

A very few breweries still use wooden vats for fermentation as wood is difficult to keep clean and infection-free and must be repitched more or less yearly.

After high kraeusen a bung device (German: Spundapparat) is often put on the tanks to allow the CO2 produced by the yeast to naturally carbonate the beer. This bung device can be set to a given pressure to match the type of beer being produced. The more pressure the bung holds back, the more carbonated the beer becomes.

2.4 Conditioning

When the sugars in the fermenting beer have been almost completely digested, the fermentation slows down and the yeast starts to settle to the bottom of the tank. At this stage, the beer is cooled to around freezing, which encourages settling of the yeast, and causes proteins to coagulate and settle out with the yeast. Unpleasant flavors such as phenolic compounds become insoluble in the cold beer, and the beer's flavor becomes smoother. During this time pressure is maintained on the tanks to prevent the beer from going flat.

If the fermentation tanks have cooling jackets on them, as opposed to the whole fermentation cellar being cooled, conditioning can take place in the same tank as fermentation. Otherwise separate tanks (in a separate cellar) must be employed.

2.5 Filtering

A mixture of diatomaceous earth and yeast after filtering

Filtering the beer stabilizes the flavor, and gives beer its polished shine and brilliance. Not all beer is filtered.

Filters come in many types. Many use pre-made filtration media such as sheets or candles, while others use a fine powder made of, for example, diatomaceous earth, also called kieselguhr, which is introduced into the beer and recirculated past screens to form a filtration bed.

Filters range from rough filters that remove much of the yeast and any solids (e.g. hops, grain particles) left in the beer, to filters tight enough to strain color and body from the beer. Normally used filtration ratings are divided into rough, fine and sterile. Rough filtration leaves some cloudiness in the beer, but it is noticeably clearer than unfiltered beer. Fine filtration gives a glass of beer that you could read a newspaper through, with no noticeable cloudiness. Finally, as its name implies, sterile filtration is fine enough that almost all microorganisms in the beer are removed during the filtration process.

2.5.1 Sheet (pad) filters

These filters use pre-made media and are relatively straightforward. The sheets are manufactured to allow only particles smaller than a given size through, and the brewer is free to choose how finely to filter the beer. The sheets are placed into the filtering frame, sterilized (with hot water, for example) and then used to filter the beer. The sheets can be flushed if the filter becomes blocked, and usually the sheets are disposable and are replaced between filtration sessions. Often the sheets contain powdered filtration media to aid in filtration.

Sheets are sold in nominal ratings, and typically 90% of particles larger than the nominal rating are caught by the sheet.

2.5.2 Kieselguhr filters

Filters that use a powder medium are considerably more complicated to operate, but can filter much more beer before needing to be regenerated. Common media include diatomaceous earth, or kieselguhr, and perlite.

2.6 Packaging

Packaging is putting the beer into the containers in which it will leave the brewery. Typically this means in bottles and kegs, but it might include cans or bulk tanks for high-volume customers.

2.7 Secondary fermentation

Secondary fermentation is an additional fermentation after the first or primary fermentation. Some beers may have three fermentations.

Bottle fermentation

Some beers undergo a fermentation in the bottle, giving natural carbonation. This may be a second or third fermentation. They are bottled with a viable yeast population in suspension. If there is no residual fermentable sugar left, sugar may be added. The resulting fermentation generates CO2 which is trapped in the bottle, remaining in solution and providing natural carbonation.

Cask conditioning

Beer in casks are managed carefully to allow some of the carbonation to escape.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter is about how the researcher will arrive at the findings of the study.

It will include research design, study population, and data collection procedures and data analysis.

3.1 Research Design

The research design to be used will be a crossectional survey including both quantitative and qualitative forms. The qualitative design will be used to collect numerical data.

3.2 Study Population

Nile breweries limited are located in Jinja district. There different stages through Raw materials are processed in the brewing process which stages all have an effect on the final outcome of the beer or its quality. Among these stages include malting. The respondents will include the selected workers and experts in different stages of the brewing process.

3.3 Sample Design

The sample will consist of ten respondents from each department the respondents will be identified depending on their willingness and availability to take part in the exercise or study.

3.4 Research Instruments

The research instruments to be used will be Questionnaires and interviews. Questionnaires will comprise of open and closed ended questions requiring respondents to answer all questions to the best of their knowledge. Interviews will be used to gather data necessary for obtaining information from respondents who will not feel inconvenienced by the researcher's requests.

3.4.1 Questionnaires

These are pre-formulated sets of open ended and closed ended questions to which the respondents will record their answers. The open ended questions will be used to get more information from respondents while open ended questions will be used to facilcitate easy

statistical data entry and analysis. 20 questions are expected to be given to collect data from those that can't be interviewed.

3.4.2 Interviews

The researcher will carry out face to face interviews with the respondents the unstructured questions will help the respondents to be open and provide more information while the structured questions will enable the researcher collect relevant data.

3.4.3 Observation

Whereas observation and interviews gather information from respondents, it's possible without asking questions by observing people in their natural working environment and recording their behaviour where the researcher becomes part of the work team and in the process observes employeees' behaviours and performances.

3.5 Research Procedure

A letter of approval will be issued by the school of Business and management as a go ahead to enable Nile Breweries limited approve for data collection. An introductory meeting will be carried out in early October to familiarize myself with them and request for particular days when the research will be conducted. Participants willing to provide information will be guided In the questionnaire filling process and questions will be asked by the researcher for clarification.

3.6 Data Analysis and Presentation

After collection of data, only correctly filed questionnaires will be coded, edited and analyzed. Analysis will be carried out by use of frequencies, percentages and true findings are prepared using tables.

CHAPTER FOUR

PRESENTATION, DATA ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter presents the findings of the data collected from the questionnaires, interviews and observations that aimed at investigating into the effects of Raw material inputs on product quality. Data was collected from20 respondents form Nile Breweries limited and was organized, analyzed and presented in quantitative form using simple percentages, graphs and pie charts.

4.1 Respondents According to Age

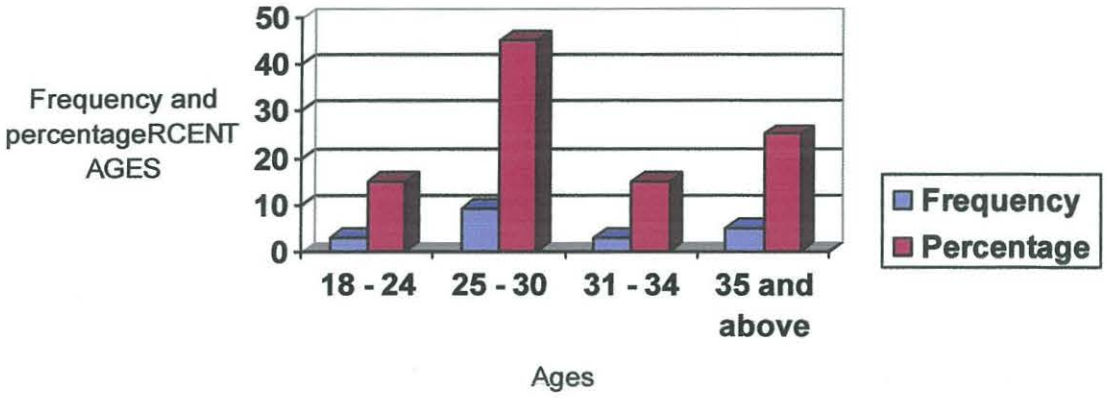
Table: 4.1: Showing the Age of the Respondents

Age of respondents	Frequency (f)	Percentage (%)
18 – 24	3	15%
25 – 30	9	45%
31 – 34	3	15%
35 and above	5	25%
Total	20	100%

Source: Primary Data

From the above table 15% of the respondents are aged from 18 – 24 years, 45% range from 25 – 30 years, 15% range from 31 – 34 years and 25% are above 35 years of age. This implies that majority of the employees in Nile breweries limited are aged between 25 – 30 years. The information is further represented in the graph below.

Figure 4.1: Showing the Age of the Respondents



4.2 Gender of Respondents

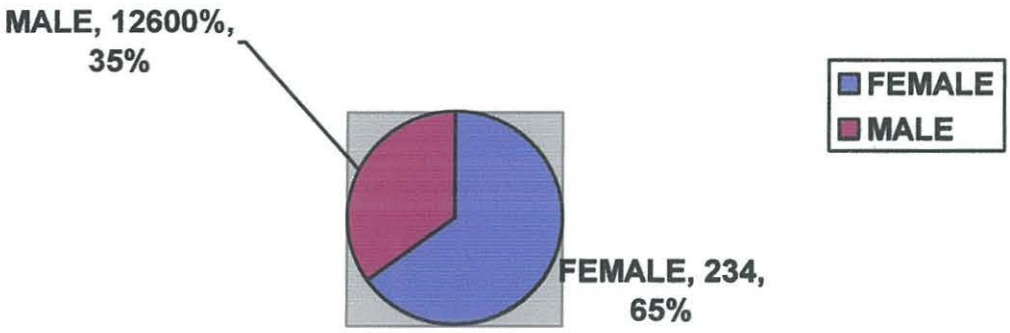
Table 4.2: Showing the Gender of Respondents

Gender	Frequency (f)	Percentage (%)	Degrees
Male	13	65%	234◦
Female	7	35%	126◦
Total	20	100%	360◦

Source: Primary Data

According to the above table, 13 respondents (65%) were male and 7 35% were female .this Data is further represented in the pie chart below.

Figure 4.2: Showing the Sex of Respondents



4.3 Level of Education of the Respondents

Table 4.3: Showing the Education level of the Respondents

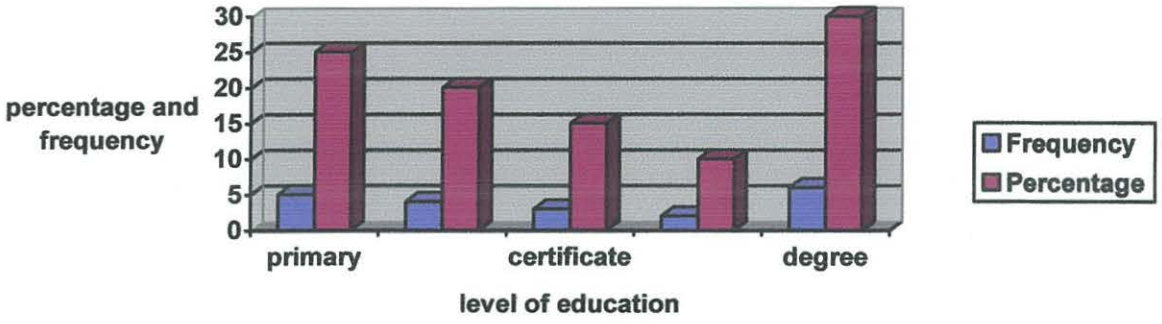
Education level	Frequency (f)	Percentage (%)
Primary level	5	25%
Secondary level	4	20%
Certificate level	3	15%
Diploma level	2	10%
Degree level	6	30%
total	20	100%

Source: Primary Data

The table below reveals that 30% of the respondents at Nile Breweries limited were degree holders, 10% had diplomas, 15 % were having certificates where as 20% were secondary school leavers and 25% were primary school leavers. From this information, most Nile breweries employees are degree holders meaning that they are highly qualified and competent enough to

perform their responsibilities. The information was further represented on a bar Grarh represented below.

Figure 4.3: Showing the Level of Education of Respondents



4.4 Working Experience of Respondents

Table 4.4: Showing the Working Experience of Respondents

Working experience in (years)	Frequency (f)	Percentage (%)
1to2	3	15%
3to5	5	25%
6to9	8	40%
10 and above	4	20%
Total	20	100%

Source: Primary Data

From the above table 4.4 15% of the respondents had worked in the organization for 2yearrs and below, 25% had worked for 3to 5 years, 40 % had worked for 9to 9 years and 20% had worked for over ten years. This implies that a minimum percentage of the workers were new in the organization and the majority had worked for long therefore most of the workers had greater working experience. The Data was also analyzed in a bar graph as shown in the figure below.

Figure 4.4: Showing the Working level of Experience of Respondents

4.5 When receiving Raw materials. How do you measure the quality of the inputs?

Table 4.5: Showing how the quality of inputs is measured

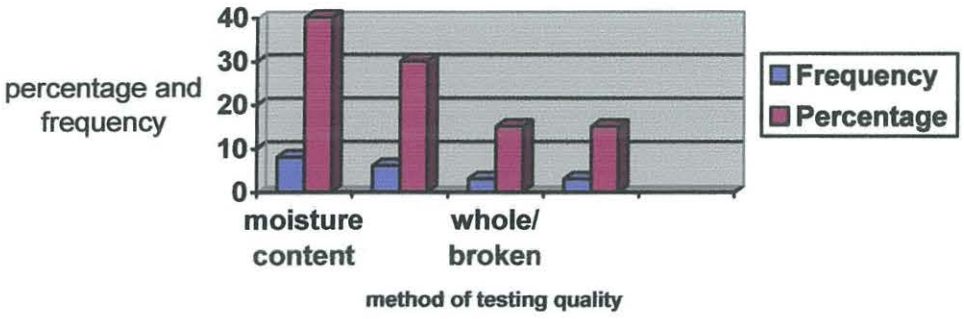
How to determine quality	Frequency	Percentage (%)
Moisture content (dryness)	8	40
Hardness of grain	6	30
Whole / broken grain	3	15
Colour of grain	3	15
TOTAL	20	100

Source: Primary Data

From the table above, 40% of the respondents state that the best way to determine quality of raw material whole grain used in Nile breweries limited is by checking the moisture content or dryness of the grains the dry grains are good because they are easily mixed with other raw materials, 30% state that to determine better quality raw materials, the hardness of the grains should be put to consideration, 15% stress that the grains should be whole and not broken and 15% state that the colour of the grains should be put to consideration for example red sorghum is preferred to dark sorghum.

The above information is represented in the graph below.

Figure 4.5: Showing how the quality of inputs is measured



4.6 In your opinion how does moisture content affect the quality of the end product?

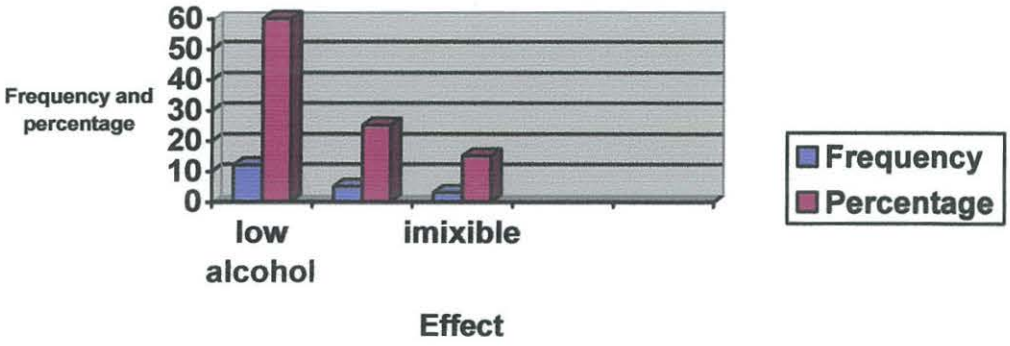
Table 4.6: Showing whether moisture content affect the quality of the end product

Effect on end product	Frequency	Percentage (%)
Low alcohol	12	60%
Poor diluting	5	25%
Imixible	3	15%
TOTAL	**20**	**100%**

Source: Primary Data

The above table shows that 60% of the respondents agree that very high moisture content in the grain results to low alcohol content in the beer, 25% of the respondents state that very high moisture content In the raw material grains causes the grains not to easily dissolve or mix in water whereas 15% state that very moisture grains cannot easily mix with other raw materials. The information is further represented in the graph below.

Figure 4.6: Showing whether moisture content affect the quality of the end product



CHAPTER FIVE

SUMMARY OF FINDINGS CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter involves the general summary of findings, conclusion and recommendations made based on the objectives of the study and the data collected from the Respondents employees of Nile Breweries limited.

5.1 Summaries

The study intends to ascertain the company's level of commitment to quality considering the crucial need of meet quality standards and satisfying customers' demands in contrast to what the competitor has to offer. For standardized quality, the company conducts in-house roasting of their grains to standardize moisture levels, sets quality standards to their suppliers of Raw materials in relation to hardness of grains, colour and whether whole or broken grains. This ensures that the quality standard of Nile Breweries limited is upheld and maintained.

The first objective of the study was to establish the effect of Raw material inputs on product quality. Most employees admitted that Raw material inputs affect product quality. This is because factors such as the colour , hardness and dryness of whole grains are highly contributive to the alcohol content, colour and taste of the final Beer. The quality of hops, Yeast sugar used also result to varying levels of alcohol content, taste and colour.

The second objective of the study was to establish the relationship between Raw material inputs and product quality. The respondents agree that very high moisture content in the grain results to low alcohol content in the beer, that very high moisture content In the raw material grains causes the grains not to easily dissolve or mix in water and that that very moisture grains cannot easily mix with other raw materials. They also agree that hops are the bitter make noble hops have less bitterness but pleasant aroma while high alpha hops have high bitter content but less pleasant aroma. Respondents also uphold that top fermenting yeast is suitable for making ales and stouts (beers with moderate alcohol content and less bitterness) whereas, bottom fermenting yeast is utilized for production of lagers (beers with high alcohol content and high bitterness).

5.2 Conclusion

Based on the findings, the researcher concluded that Nile breweries limited conducts careful choice of its Raw materials and ensure that their beers are of good quality with balanced taste, moderate alcohol content and good aroma.

The relationship between raw material inputs and product quality exists in terms of moisture of grains and alcohol content, hardness of grains and ability to mix with other Raw materials, type of yeast and level of alcohol content and lastly type of hops and level of bitterness and level of pleasant aroma.

5.3 Recommendations

With consideration of the research findings, the following recommendations are necessary.
Include scent or smell as means of measuring quality of whole grain Raw materials. Good quality barley, sorghum or rye maintains a healthy scent when not affected by external factors like rain or decay. The grains should also be scented to identify good quality.

Initiate out growers. For desirable quality of whole grains like sorghum, Nile breweries should mobilize out growers who will be trained on the good cultivating measures to produce good quality grains.
Carry out research and development. Nile breweries should carry out research so as to be able to find out new local and cheaper substitutes for some of the raw materials.

5.4 Areas for Further Research

The effect of inventory management on product quality.
The importance of quality control to customer satisfaction.

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APPENDICES

APPENDIX A

RESEARCH INSTRUMENTS

1. QUESTIONNAIRE

As a student pursuing a degree in supplies and procurement management, I am carrying out a research on the topic "the effect of Raw Material inputs on product quality". The research is conducted in the fulfillment of a bachelors degree in supplies and procurement management. I hereby request for your contribution to this study to enable my successful completion of this course. Your response will be confidential and strictly for academic purposes.

PERSONAL DATA

Please tick in the appropriate box

SECTION A: DEMOGRAPHIC INFORMATION

1. AGE

18-24 ☐

25-30 ☐

31-34 ☐

35 and above ☐

2. GENDER

Male ☐

Female ☐

3. MARITAL STATUS

Married ☐

Single ☐

4. LEVEL OF EDUCATION

Primary ☐

Secondary ☐

University ☐

Diploma ☐

Others (Please specify) _____

5. WORKING EXPERIENCE (number of years you have been working for Nile breweries limited).

1day -2 years ☐

2 years -5 years ☐

6 years-9 years ☐

Over 10 years ☐

SECTION B

6. What do you understand by the word quality?

_____

_____

7. When receiving Raw materials. How do you measure the quality of the inputs?

Moisture content (dryness)

Hardness of the grains ☐

Colour of the materials ☐

Whole / broken grains ☐

8. In your opinion how does moisture content affect the quality of the end product?

It makes the alcohol content to be very low ☐

It does not dissolve in water easily ☐

It does not mix well with other inputs ☐

9. What do you recommend as a measure to improve the quality of inputs?

All inputs must be dried within the company ☐

Keep all inputs in a well ventilated store ☐

Advise suppliers to comply with the required ☐

Moisture level standards ☐

Thank you for your time and contribution

2. INTERVIEW GUIDE

1. What do you understand by the word quality?
2. What aspects of quality do you consider in Nile breweries limited?
3. When receiving Raw materials. How do you measure the quality of the inputs?
4. In your opinion how does moisture content affect the quality of the end product?
5. What do you recommend as a measure to improve the quality of inputs?