TECHNICAL REPORT ON STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

Siwes Report

UNDERTAKEN AT

LOBA FOOD INDUSTRY

2, SHORIOLA AFOLABI CRESCENT, OFF ONIKANGA ROAD, BADECK, AYOBO, LAGOS STATE

By:

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ND/23/FST/PT/0006

SUBMITTED TO:
DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY, INSTITUTE OF APPLIED SCIENCES (IAS) KWARA STATE POLYTECHNIC, ILORIN IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF NATIONAL DIPLOMA (ND) IN FOOD SCIENCE AND TECHNOLOGY

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CERTIFICATION

This is to certify that this SIWES was carried out by KAREEM, Rokibat Ayomide with Matric Number: ND/23/FST/PT/0054 in the Department of Food Science and Technology, Institute of Applied Sciences (IAS), Kwara State Polytechnic, Ilorin.

DEDICATION

This SIWES is dedicated to Almighty God, the Author and Finisher of my faith.

ACKNOWLEDGEMENTS

First and foremost, I appreciate Almighty God for giving me the privilege to partake in the Students Industrial Work Experience Scheme (SIWES).

I acknowledge my amiable and dynamic Mr and Mrs. Adio for their financial, moral and spiritual caring and support during the course of my SIWES programme.

I also appreciate my Industrial based supervisor for their patient, endurance, courage and kind support during the course of my stayed in the Aloba Food Industry.

I wish to also acknowledge my school based supervisor, for their support, encouragement and kind during their visitation to Aloba Food Industry.

I also acknowledge the effort of my honourable HOD and other lecturers for their words of encouragement during my stay in the citadel of learning.

Finally, I appreciate my colleagues in the same industrial based training, I pray Almighty God will grant us success in all our endeavor (Amen).

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CHAPTER ONE

1.1 Introduction to the Student Industrial Work Experience Scheme (SIWES)

The Student Industrial Work Experience Scheme (SIWES) is a practical training program in Nigerian tertiary institutions that provides students with hands-on industrial exposure. It bridges the gap between theoretical classroom knowledge and real-world applications, particularly in fields like Biochemistry, Engineering, and Technology. SIWES equips students with essential skills in handling industrial equipment and machinery, enhancing their technical competence and readiness for the workforce. The program is coordinated by the SIWES unit within each institution in partnership with the Industrial Training Fund (ITF) and other regulatory bodies. Participation is mandatory for students in specific fields, often during the final years of their academic programs, lasting three to six months. Successful completion of the SIWES program is a partial requirement for earning a Bachelor's degree in disciplines where practical training is integral.

1.2 History Of Siwes In Nigeria

The ITF established SIWES in 1973 to address the lack of practical skills among Nigerian graduates. Initially, ITF solely funded and managed the program, allowing students to gain exposure to industry-specific equipment and practices not available within their institutions. Due to administrative and financial demands, the scheme was handed over to regulatory agencies like the National Universities Commission (NUC) in 1979. However, in 1984, ITF resumed its role as the primary administrator, working alongside regulatory bodies and industries to manage SIWES. The program is now an integral part of education in Nigeria, providing students with the opportunity to gain practical skills essential for their future careers.

1.3 Role Of Industrial Training Fund

The ITF performs several key roles in ensuring the success of the SIWES program:

- **Policy Formulation**: ITF develops guidelines and policies to standardize SIWES across institutions and industries.
- **Student Orientation**: ITF conducts orientation sessions for students to prepare them for their industrial attachments.
- **Industrial Placement Assistance**: ITF maintains a database of companies for student placements and assists institutions in securing placement for students.
- **Supervision and Monitoring**: ITF supervises students during their attachments, ensuring they gain practical skills relevant to their field of study.
- **Funding and Allowances**: ITF disburses stipends to students and supervisory allowances to institutions. The agency also provides insurance coverage for students during their training.
- **Research and Development**: ITF continuously evaluates the SIWES program, making improvements based on feedback and industry advancements.

1.4 Goals And Objectives Of SIWES

This scheme was set out to bridge the gap between the theoretically trained students in tertiary institutions and the practical application in the labour field. The student will be able to stand better chance and advantage for acquiring practical skills to his or her theoretical knowledge than a technical man. However, this practical grooming exercise according to Industrial Training Funds Policy Document No. 1 of 1973 which established SIWES is expected to achieve the following objectives:

- To provide student with an opportunity to apply their theoretical knowledge in real work environment thereby bridging the gap between what they learn in university and is actually practiced outside.
- To expose students to work methods and techniques in handling equipment and machinery that may not be available in the university.

- To provide an avenue for students in the Nigeria universities to acquire industrial skills and experience in their course of study.
- To expose students to industrial norms and culture.
- Enlisting and strengthening employers' involvement in the entire educational process and preparing students for employment in industry and commerce.

In order to realize these objectives, I undertook my SIWES at LOBA FOOD INDUSTRY, Ayobo, Lagos State.

CHAPTER TWO

2.1 Background And History Of Loba Food Industry

LOBA FOOD INDUSTRY, established by Mr. Akinkunmi John in 2015 and later incorporated, operates under the brand name "LABA FOODS." The company specializes in processing and packaging easy-to-prepare foods with a focus on hygiene, mechanization, and quality control. Loba Food aims to provide unadulterated, nutrient-rich food products that cater to the demands of a fast-paced lifestyle, ensuring health benefits without compromising natural quality. Loba Food currently offers a variety of products, primarily under the "LABA" brand, including Poundo Yam flour, Rice flour, Beans flour, Unripe Plantain flour, Garri Ijebu, Whole Brown Beans, Smoked Catfish, and Labavita. In addition, "IBILE" Chilli Pepper is available under a separate brand name. The company's commitment extends beyond profit, as it actively contributes to Nigeria's agricultural sector and addresses unemployment through its operations.

2.2 Mission And Objectives Of Loba Food Industry

- **Mission:** Loba Food is dedicated to providing high-quality, easy-to-prepare foods to various consumer segments within Nigeria and globally. The company emphasizes excellence, creativity, and affordability in delivering nutritious products, all within an environment that values diversity, teamwork, and innovation.
- **Vision:** Loba Food aspires to become a leading provider of healthy, indigenous packaged foods in Nigeria, aiming to be the preferred brand in West Africa within the next five years. The company is committed to supporting the development of local food processing and promoting nutritional products that reflect Nigerian heritage.

2.3 Organizational Structure of Loba Food Industry

LOBA FOOD INDUSTRY has a well-defined organizational structure that enables efficient management and production. Below is an overview of the company's principal divisions:

2.3.1 Organogram Of Loba Food Industry

The organizational structure of LOBA FOOD INDUSTRY is led by its **Board of Directors**, who set the strategic direction of the company. Below the board, **Principal Management** oversees key operations, with Sales Executives managing sales strategies and revenue growth, while Modern and Open Trade Executives handle distribution through both contemporary and traditional trade channels. Merchandisers play an essential role in ensuring product visibility and brand consistency across markets.

The **Production Management** division includes the Quality Control and R&D team, which maintains high product standards and fosters innovation. The Production Department oversees the entire manufacturing process, ensuring quality and efficiency at every stage of production.

The **CFO (Chief Financial Officer)** is responsible for financial oversight, including Accounting and Finance for financial transactions and reporting. Supply Chain & Logistics manage the efficient movement and storage of products, while the Inventory & Store department ensures inventory control to meet demand effectively.

Lastly, the **HR (Human Resources) and Administration** department handles recruitment, employee training, and welfare, contributing to a healthy workplace culture. Supporting this, Security and Office Assistants ensure a safe and conducive work environment, enabling staff to perform optimally. Together, these departments create a cohesive structure that drives the company's mission and operational excellence.

2.4 Departments In Loba Food Industry

Production Floor

The production floor is organized into key processing units that ensure quality and efficiency in food production:

- **Raw Materials Unit**: Handles the initial processing of raw ingredients.
- **Washing & Slicing Section**: Prepares raw materials for further processing.

- **Parboiling and Granulating Units**: Prepares and refines products.
- **Aerating, Drying, and Sieving Units**: Ensures quality and consistency in texture.
- **Milling and Blending/Mixing**: Produces the final product texture and blends flavors.
- **Packaging Section**: Ensures products are properly packed and labeled for distribution.

Quality Control Department

This department is responsible for product quality and includes:

- **Sensory Analysis Unit**: Ensures products meet sensory quality standards.
- **Research and Development (R&D)**: Continuously improves products and develops new offerings.
- **Documentation and Retainment**: Manages records to maintain quality consistency.

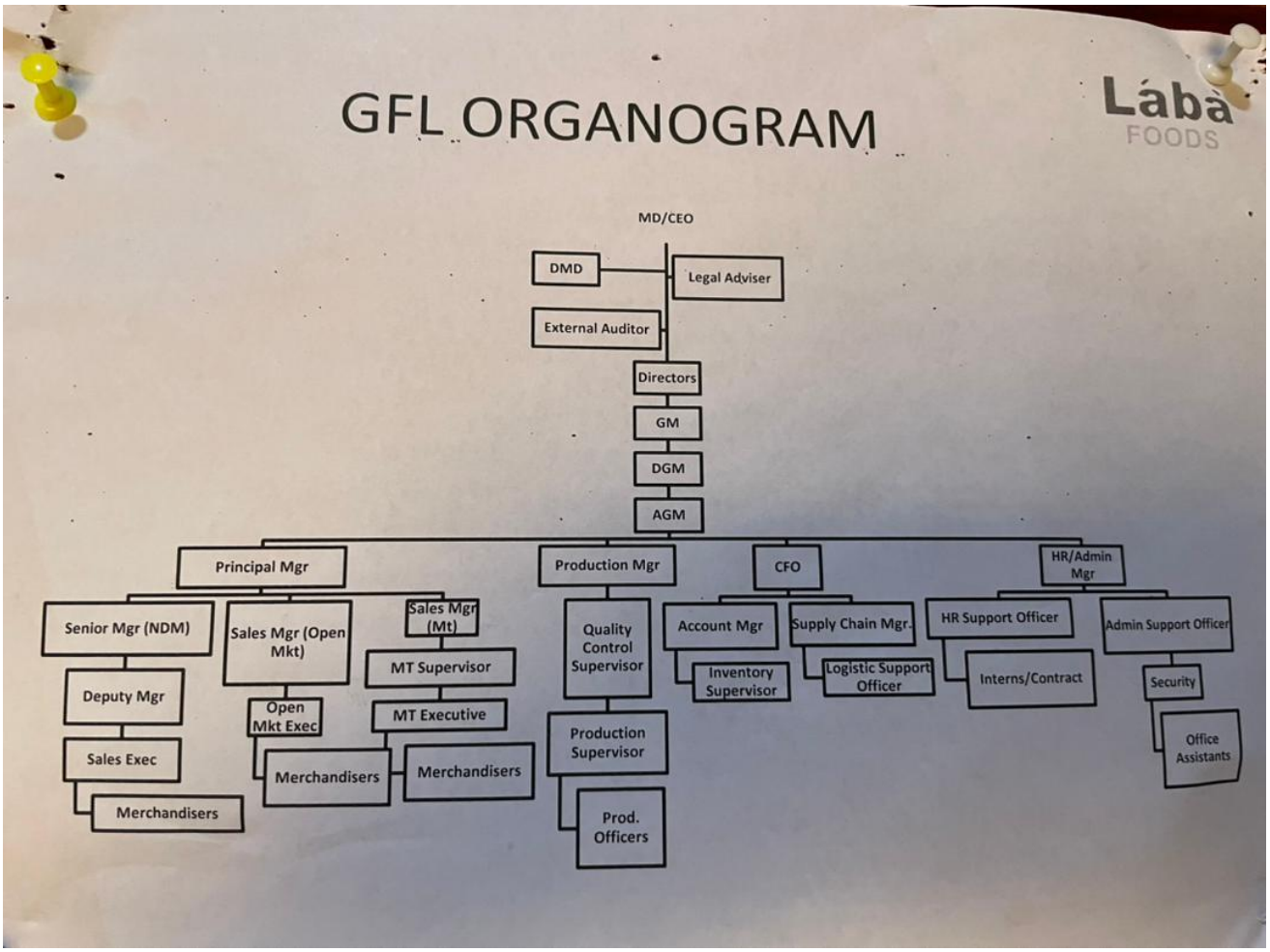

Fig 2.1: Organogram of Goldbridge Foods Limited [Laba Foods]

CHAPTER THREE

3.1 Overview Of Products At Loba Food Industry

LOBA FOOD INDUSTRY produces a range of indigenous food products designed to meet high-quality standards while fulfilling the dietary and convenience needs of consumers. The product line includes Beans Flour, Rice Flour, Smoked Catfish, and Poundo Yam Flour. Each product involves distinct biochemical considerations to maintain nutritional integrity and shelf stability. For instance, each product's production process considers factors like moisture content, microbial load, enzymatic activity, and pH levels. These factors are meticulously controlled to ensure that the final products are safe, consistent, and meet consumer expectations.

Fig 3.1: Organogram of Goldbridge Foods Limited [Laba Foods]

3.2 Machinery And Equipment Used In Production

To maintain high-quality standards and ensure the biochemical stability of its food products, Loba Food employs specialized machinery throughout its production processes.

- **Parboiler**: Used mainly in the production of Poundo Yam Flour, initiating starch breakdown to achieve desired texture and enhance digestibility by making starches easier to gelatinize during reconstitution.
- **pH Meter**: Loba Food uses a pH meter to control acidity levels, crucial for food product biochemical stability. This helps minimize enzymatic reactions and microbial growth, especially in products like beans and rice

flour, preventing spoilage and maintaining sensory and nutritional properties.

Fig 3.2: A parboiler

Fig 3.3: Digital moisture analyzer

Fig 3.4: A hand-digital PH meter

- **Moisture Analyzer**: The moisture analyzer is crucial for monitoring moisture levels in products, preventing spoilage organisms and enzymatic reactions, especially in smoked catfish and flours, where slight variations can significantly impact shelf life and sensory attributes.
- **Tree Rack**: Tree racks are used in cooling parboiled yams, promoting aeration, moisture reduction, and even drying, preventing enzymatic browning that can affect the final flour product's appearance and taste.
- **Industrial Cabinet Dryer**: The equipment uses controlled heat to inhibit enzymes and reduce microbial activity in products, preventing the degradation of sensitive nutrients and enzymes while preserving texture and flavour, crucial for biochemical stability and preventing spoilage.

Fig 3.5: An industrial cabinet dryer

Fig 3.6: A hammer milling machine

- **Milling and Grinding Machine**: The milling and grinding machines ensure that flour products achieve a consistent particle size, which is vital for texture and ease of use in various culinary applications. The machines are designed to operate at temperatures that avoid denaturing proteins or losing volatile compounds, maintaining the nutritional and sensory qualities of the flours.
- **Sealing Machine and Semi-Packaging Equipment**: Packaging plays a crucial role in protecting products from external factors that could affect quality. The sealing machine and semi-packaging equipment ensure that each product is hermetically sealed, preventing moisture ingress and microbial contamination. Proper packaging preserves the biochemical integrity of the product by keeping oxygen and light out, which can degrade sensitive nutrients and cause rancidity in fat-containing foods.

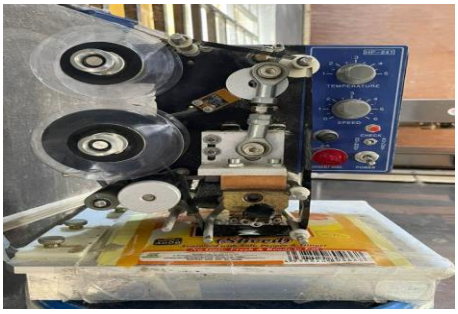

Fig 3.7: Contact Coding machine

Fig 3.8: A continuous-bound sealing machine

- **Coding Machine:** Coding machine is used for printing batch numbers, manufacturing dates and expiration dates on pouches. There are two (2) types of coding machine which are Contact and Non-contact coding type but at Laba Foods the Contact coding machine is being used.
- **Scale/Scaling Machine:** Scale is use for measuring weight. There are different types of scale but at Laba we use two types of scale, which are “counting scale” use for measuring weight of product in pouches when manually filling the pouches and “bench scale”, a bigger sized scale use for measuring weight of product in large quantity or raw material.

Fig 3.9: Counting Scale

Fig 3.10: Bench Scale

3.3 Production Processes For Each Product

The production processes at Loba Food are crafted to ensure quality and biochemical stability across all stages. Each step from raw material handling to packaging is carried out with strict adherence to quality standards.

3.3.1 Poundo Yam Flour Production

Loba Food produces “Poundo yam” flour using *Dioscorea rotundata*, a white yam species rich in carbohydrates and minerals. The process involves raw material acquisition, quality check, parboiling and gelatinization, aeration and drying, milling, and packaging. White yam tubers are sourced from reliable suppliers and undergo visual inspection to ensure their biochemical composition. Parboiling partially cooks the yam, improving digestibility and texture. Aeration reduces moisture, while controlled drying ensures shelf stability. The dried yam is finely milled to a consistent particle size, and the flour's pH is monitored for biochemical stability. The final product is packed in moisture-resistant pouches to maintain texture, flavor, and nutritional content, particularly carbohydrate and potassium levels, which are beneficial for energy and blood pressure regulation.

3.3.2 Rice Flour Production

Rice flour is made from *Oryza sativa*, known for its gluten-free profile and digestibility. After thorough washing, rice is dried to inhibit microbial growth and maintain stability. Milling yields a consistent texture, and pH adjustments help preserve shelf life. Rice flour is packed to retain its calcium and zinc content, supporting bone health and immunity.

3.3.3 Beans Flour Production

Beans flour production involves biochemical steps to maintain high protein and fiber content while ensuring safety through moisture and pest control measures. Nigerian Brown Beans are commonly used due to their protein-rich profile. Beans are sourced in bulk, screened for defects, and dried to reduce moisture content and maintain protein structure. The dried beans are milled into fine flour, with strict temperature control to avoid denaturation, and moisture-resistant packaging to maintain freshness and stability.

3.3.4 Smoked Catfish Production

Smoked catfish is made using biochemical techniques to preserve protein and fat stability while extending shelf life. The process includes trimming and cleaning already smoked catfish to prevent spoilage. The fish is dried under regulated heat, reducing water activity and preventing microbial growth. The fish is then packed in moisture-resistant materials to maintain its stability and prevent microbial and enzymatic activities from degrading the protein and fats.

3.3.5 Unripe Plantain Flour Production

Unripe plantain flour is a nutritious, high-fibre alternative to other flours. It is produced through a process that retains its natural resistant starch and potassium levels, which have health benefits. The plantains are selected for their high starch content and low sugar levels, the plantains are purchased dried and milled into fine flour and packed to prevent moisture absorption. This flour supports gut health and blood sugar management, with potassium aiding blood pressure control.

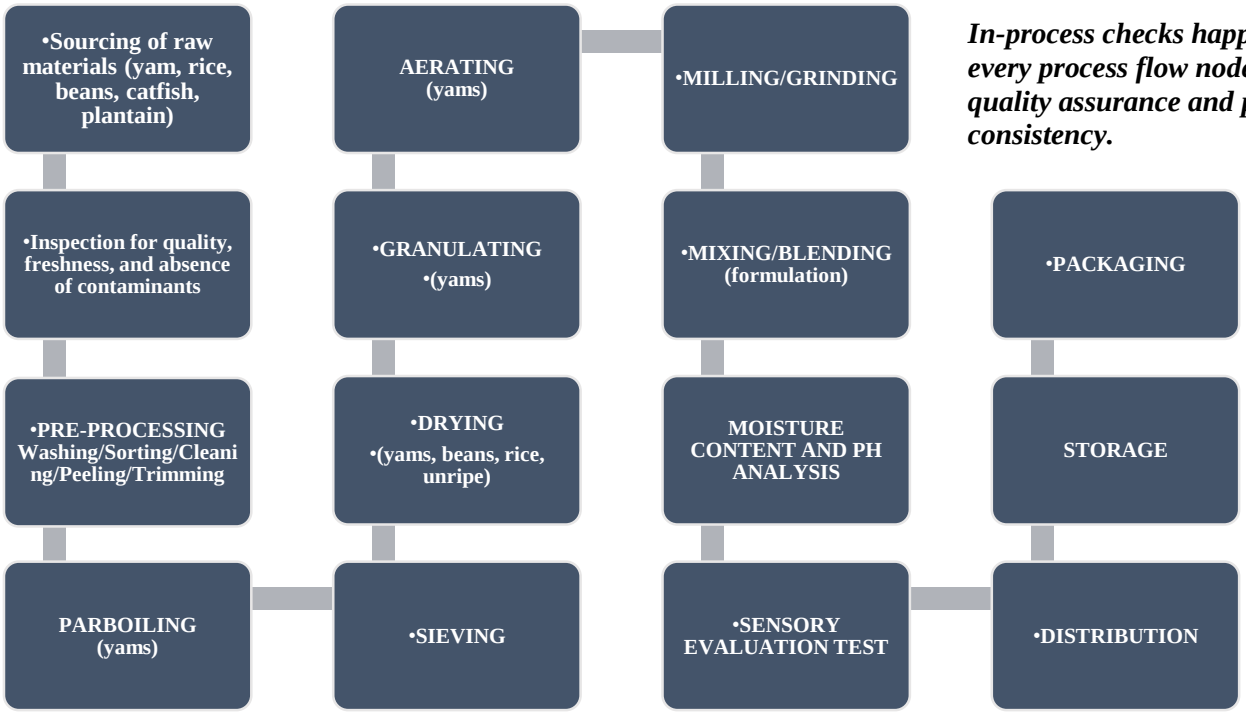

FIG 3.11 SCHEMATIC REPRESENTATION OF TYPICAL PROCESS FLOW AT GOLDBRIDGE FOODS LIMITED

CHAPTER FOUR

4.1 My Experience in the Production Unit

During my time at LOBA FOOD INDUSTRY for SIWES, I had the incredible opportunity to immerse myself in hands-on food production. I worked on processing various products like beans flour, rice flour, poundo yam flour, smoked catfish, and unripe plantain flour. Seeing each stage up close and even participating in some allowed me to understand the meticulous care and science that go into ensuring quality, nutrition, and safety. Every step was rooted in food science and biochemistry—whether it was the dehydration process that preserves flour or the smoking of fish to extend shelf life. I saw firsthand how biochemical reactions shape each product and learned how the company manages these reactions to produce high-quality, safe foods.

4.2 Quality Control Practices I Observed

Quality control (QC) was at the heart of every production stage. I quickly learned that QC isn't just about checking off boxes; it's about maintaining and enhancing the product's safety, nutritional value, and overall consistency through specific biochemical practices. Moreover, comprehensive biochemical analysis was contracted to a public analyst, *Emachy Laboratory Services,* due to unavailability of standard laboratory facilities.

4.2.1 pH and Moisture Control

One major part of QC I saw in action was the control of pH and moisture. These two factors are essential for controlling microbial growth and enzymatic activity—two things that can make or break the quality of the product.

- **Enzyme Inhibition and Microbial Control**: I realized that keeping pH and moisture levels in check is critical for stopping unwanted enzyme reactions and microbial growth. In the production of beans and rice flour, for example, reducing moisture during drying not only prevents spoilage but also keeps the texture and flavor stable. This careful moisture management means a longer shelf life and a safer product.

4.2.2 Sensory Evaluation

Sensory evaluation was one of my favourite aspects of QC. I saw how taste, texture, and appearance are rigorously tested to ensure the product meets quality standards and that these sensory qualities are rooted in biochemistry.

Texture, Taste, and Appearance: Every product went through regular sensory checks to make sure it looked, tasted, and felt just right. The poundo yam flour, for instance, had a specific texture we aimed for, achieved by controlling starch gelatinization during production. Smoked catfish, on the other hand, required careful drying to avoid rancidity while preserving its rich flavor.

4.3 Understanding the Biochemical Role of Additives and Preservatives

In production, I saw how certain additives and preservatives play specific biochemical roles to enhance the product's quality and stability.

- **Sodium Metabisulfite**: This was used to keep yam flour fresh and to prevent browning, which would affect the product's look and appeal. Sodium metabisulfite releases sulphur dioxide, which acts as an antioxidant and microbial inhibitor, preserving both colour and shelf life.
- **Ethanol**: I observed ethanol being used as a sterilizing agent to keep equipment and surfaces free of bacteria and other microorganisms. Its role as a protein denaturant in microbial cells makes it highly effective in maintaining sanitary conditions.
- **Cassava Starch**: As a thickener in poundo yam flour, cassava starch added a smooth, gel-like consistency to the product. It binds water molecules, helping to achieve the desired mouthfeel and texture that consumers expect.

4.4 Quality Control Measures in Action

Throughout the production process, I witnessed various QC measures designed to ensure that each batch met the company's high standards.

- **Batch Numbering, Packaging, and Sealing**: Batch identification, meticulous packaging, and proper labelling ensured traceability, product

safety, and essential consumer information, while carefully selecting materials to protect against moisture and contamination.

- **Ensuring Consistency and Safety in Final Products**: The team conducted regular batch testing and monitored physical and chemical parameters closely, catching any inconsistencies early in the process. I learned that this level of precision in QC is what guarantees a consistent, reliable product.

CHAPTER FIVE

5.1 Challenges Faced During the SIWES Programme

During my SIWES at LOBA FOOD INDUSTRY, I encountered several challenges:

1. **Difficulty in Securing Placement:** Finding an appropriate industrial placement was challenging due to limited opportunities and high competition.
2. **Equipment Familiarization:** Adapting to the specific machinery and equipment used in the production unit required significant time and effort.
3. **Limited Access to Advanced Analytical Instruments:** The absence of advanced analytical instruments hindered in-depth biochemical analysis.

5.2 Recommendations

Investing in advanced biochemical analysis tools like HPLC and microbiological testing kits can improve quality control precision and provide students with better learning tools. Regular biochemical training for staffs and recruits on modern techniques can enhance product quality and safety, while also providing students with current knowledge and skills.

5.3 Summary and Conclusion

My SIWES experience at LOBA FOOD INDUSTRY provided invaluable insights into the practical application of biochemistry in the food industry. I gained hands-on experience in various production processes, quality control measures, and biochemical analysis techniques.

By addressing the challenges and implementing the recommended improvements, future SIWES students can benefit from a more enriched learning experience. Additionally, the company can further enhance its product quality and safety standards.

In conclusion, my SIWES experience has solidified my understanding of the critical role of biochemistry in food production and quality control. I am

eager to apply this knowledge to future endeavours and contribute to the advancement of the food industry.

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