NATIONAL COUNCIL FOR TECHNICAL EDUCATION

NOVEMBER 2022

PROPOSED OCCUPATIONAL STANDARDS

FOR BIOPROCESS AND POST HARVEST ENGINEERING

OCCUPATION: BIOPROCESS AND POSTHARVEST ENGINEER

LEVEL: NTA 7

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FOREWORD

The National Council for Technical Education (NACTE) is a corporate body established by the National Council for Technical Education Act, Cap.129. The Act provides a legal framework for the Council to coordinate the provision of technical education and training in Tanzania. The mandate of NACTE is three-fold, namely; Regulatory, Quality Assurance and Policy Advisory.

In discharging its mandate, the Council has been charged with the responsibilities, among others, to:

(a) assist technical institutions in the transmission of knowledge, principles and training in the field of technical education and training for the benefit of the people of Tanzania;
(b) assist technical institutions in the overall development of the quality of education they provide and to promote and to maintain approved academic standards;
(c) establish and make awards in technical education which are consistent in standard and comparable to related awards in Tanzania and internationally; and
(d) ensure that the quality of education required for the awards is met and maintained throughout the duration of the delivery of the course.

In the course of execution of these responsibilities, the Council has been instituting various measures aiming at advancing the quality of training provided in technical institutions in respect of the changing demands of the labour market, both local and international.

To achieve the above obligation, NACTE, under the Ministry of Education, Science and Technology implemented the East Africa Skills for Transformation and Regional Integration Project (EASTRIP), a project aiming at promoting regional integration through supporting the regional corridors and sector markets, developing common standards and qualifications, and promoting mobility of students, faculty, and graduates. The project supports the Government of Tanzania to address shortage of skills in five sectors namely:

(a) Energy;
(b) Construction;
(c) Information and Communication Technology (ICT);
(d) Transportation; and
(e) Agribusiness.

To address the skills, miss-match and shortage in the five (5) sectors in the country, the project funded, among others, a component of Development of Occupational Standards for Technical and Vocational Education and Training (TVET). In this regard, NACTE endeavoured to identify qualified and highly experienced experts in the five sectors from both the industry and training institutions to carry out the development of Occupational Standards. The exercise was carried out at Morogoro Teachers College – Morogoro from 27th August to 24th September, 2021. The output of the exercise is Occupational Standards for 14 occupations. Occupational standards for Bioprocess and Post-Harvest Engineer are among the occupational standards for 26 occupations which have been developed.

Since Occupational Standards are statements of work performance reflecting the ability to successfully complete the functions required in an occupation, as well as the application of knowledge, skills, attitudes and understanding in an occupation, it is the Council's expectations that the developed standards will form a robust base for decision making and provide explicit guidance to policy makers, curriculum developers, educators, employers and other stakeholders in matters related to manpower planning as well as execution of Technical and Vocational Education and Training undertakings.

Prof. J. W. Kondoro
CHAIRMAN

Dar es Salaam
NOVEMBER, 2022

ACKNOWLEDGEMENT

The National Council for Technical Education (NACTE) is charged with the mandate to be the Quality Assurance organ of the Government in matters related to Technical and Vocational Education and Training (TVET) and production of qualified manpower for both local and international labour markets. In order to realize this obligation, NACTE endeavours to institute policies, guidelines and standards and to set the quality benchmarks for training institutions.

However, this is only possible if there is a strong base, linking the training institutions on one hand and the demands of the industry/labour market for relevant manpower on the other hand. Therefore, the Council undertook a step to develop Occupational Standards in sectors considered to be the engine to steer the country's desire to achieve an industrial economy. This exercise would not be a success without the input and support from our stakeholders. I am indebted to acknowledge some of them here.

I wish to acknowledge and appreciate the support from the Ministry of Education, Science and Technology through the East Africa Skills for Transformation and Regional Integration Project (EASTRIP)for the financial support which facilitated the preparation of this document. I wish also to appreciate Mrs Leah Lukindo and Eng. Dr. Simon Baregu for the tireless efforts and commitment in facilitating and guiding the standards development process, Ms. Eileen Tzamburakis, Ms. Chausiku Yakweli Ibrahim and Ms. Nuru Shirima for compiling and typesetting the final document; and the NACTE Secretariat for coordinating the whole activity.

In a very special way, I wish further to extend my sincere gratitude to this team of wonderful experts who tirelessly dedicated their time and availed their invaluable intellect in the preparation of this document. I would like to recognize the colossal inputs of the following experts:

S/N	Name	Designation	Organization
1.	Eng. Kimweri G. Baguma	Head Miller	CPB
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3.	Eng. Mahmoud Bashemela	Supervisor	Pyxus Agriculture Tanzania
4.	Eng. Susan A. Mbacho	Tutorial Assistant	Sokoine University of Agriculture (SUA)

In addition, NACTE hopes to further enhance the internationalization of occupational standards and promote the modernization and internationalization of industries, facilitating Tanzania's integration into the international market and exploiting its development potential. Therefore, NACTE has invited China-Africa Vocational Education Alliance and China-Africa (Chongqing) Vocational Education Alliance to participate in the development, revision and review of occupational standards documents in collaboration with Chinese vocational institutions, so as to make use of their rich experience in vocational education efforts and rely on China's advanced and complete industrial chain and its position in the international market to contribute to the development of vocational education and related industries in Tanzania.

Therefore, I would like to express my sincere gratitude to this specialized team of Chinese institutions and experts. I thank them for their hard work and dedication, and for contributing their wisdom and experience to the preparation of this document. I would like to thank the following institutions and experts for their support:

S/N	**Institute**	**Name**	**Title/ Professional Field**
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ABBREVIATIONS

AP	Agricultural Produce
FIFO	First In First Out
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
KPIs	Key Performance Indicators
NACTE	National Council for Technical Education
NOS	National Occupational Standards
OS	Occupational Standards
OSHA	Occupational Safety and Health Agency
SOPs	Standard Operating Procedures
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues
Competence:	The ability to use knowledge, understanding, practical and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based education:	An instructional program that derives its content from validated tasks and bases assessment on the learner's performance
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/training programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational analysis:	A process used to identify the tasks that are important to employees in any given occupation
Occupational area:	This is a broad grouping of related jobs. Example: food service
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as performance tool of assessment of the pre – scribed outcomes.

Performance criteria:	Indicate the expected end results or outcome in form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standards:	it is a set of statement, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.
Task analysis:	The process of analysing each task to determine the steps, related knowledge, attitudes, performance standards, tools and materials needed, and safety concerns required of employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, consists of two or more definite steps, and leads to a product, service, or decision.
Underpinning Knowledge:	This is crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification process:	The process of having experts review and conform the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.
Occupational Competence:	The application of knowledge and skills to perform consistently to the standards required in the work context.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's Development Vision 2025 intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical wiring circuits, performs trouble shooting in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to demands of the labour market.

In TET delivery, Tanzania adopted the Competence-based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point

for developing Competence-based Education and Training (CBET) programs. TET institutions will be required to benchmark their curricula with relevant occupational standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Bioprocess and Post-Harvest Engineer Occupation has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The 10-year National Skills Development Strategy (2016-2026) was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes. These sectors include: Transport and logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The workshop thereafter continued with the development of occupational standards. Experts in Occupational Analysis and Occupational Standards Development facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the occupational standards. Engineers, supervisory technicians on the job, and experienced Bioprocess and Post-Harvest experts were key informants in the survey to establish occupational trends. This information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are equipped for working in the occupation. A total of …….. online surveys were completed by experts from the labour market across the

country. Apart from the survey aiding in defining the scope for the occupational analysis, they served to engage a wide cross-section of experts in the occupation. The stakeholders' forum was attended by ……. participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR BIOPROCESS AND POSTHARVEST ENGINEER

The Bioprocess and Post-Harvest Engineer plays an important role in areas like agricultural produce collection, transport, storage and processing. The standard covers the main duties of Bioprocess and Post-Harvest Engineer as follows:

a) Control losses of agricultural produce (AP) from harvesting to storage;
b) Develop equipment for processing and handling of agricultural produce (AP);
c) Maintain key performance indicators (KPIs) for production process of Agricultural Produce (AP);
d) Establish losses in production line for agricultural produce;
e) Develop packaging for agricultural produce (AP) and processed products;
f) Develop budget for production, maintenance and marketing of finished product;
g) Manage production process of agricultural product;
h) Prepare maintenance plan for the processing plant; and
i) Manage waste in production line.

The standards have been clustered into NTA qualification levels i.e. NTA level 7 and 8.

4.0. VALIDITY PERIOD

The occupational standards will be valid for 3-5 years due to the fast-changing nature of technology. The review will proceed in the same manner as the previous one, with new occupational standards being developed based on current labour market information.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR BIOPROCESS AND POSTHARVEST ENGINEER – NTA 7

OCCUPATION	BIOPROCESS AND POST HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CONTROL LOSSES OF AGRICULTURAL PRODUCE (AP) FROM HARVESTING TO STORAGE	**DUTY NO.**	701
TASK TITLE	CONDUCT PROPER HARVESTING OF A PARTICULAR AP	**TASK NO.**	7011
PERFORMANCE CRITERIA	The person performing this task must be able to conduct proper harvesting of a particular AP as per standards and procedures approved by a competent authority.		
RANGE STATEMENT	The task will be performed on farm under the supervision of a Senior Engineer. The following equipment, tools and materials will be needed in performing the task: Harvesting machine, sickle, knives, hoe, P.P.E, bags, baskets, trays, combine harvester machine, tractor.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain clear and detailed information about AP to be harvested; 2. Observe AP condition to be harvested (E.g., check for moisture content, maturity level) ; 3. Observe weather of the working environment (farm) ; 4. Select right tools and equipment for the task; 5. Select proper method for harvesting of a particular AP; 6. Identify correct time for harvesting (E.g., morning, evening) ; 7. Prepare tools and equipment for harvesting AP; 8. Prepare temporary storage area for harvested AP; 9. Perform harvesting of AP; 10. Collect harvested AP; 11. Conduct pre-cleaning of the harvested AP; 12. Perform sorting of harvested AP (E.g., size, colour, weight) ; 13. Store temporarily the harvested AP for transportation;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Harvest; 1.2. Handle harvesting tools and equipment; 1.3. Handle harvested AP; 1.4. Clean. **2.0. Principles** The person must be able to explain the principles of HACCP. **3.0. Theories** The person must be able to explain: 3.1. Perishable crop properties; 3.2. Semi perishable crop properties; 3.3. Non- perishable crop properties; 3.4. Uses of harvesting tools and equipment; 3.5. Various method of harvesting; 3.6. Handling of harvested AP; 3.7. Methods of cleaning. **4.0. Essential skills** 4.1. Teamwork skills;

14. Clean working environment, tools and equipment; 15. Store tools and equipment as per standards and procedures; 16. Complete forms, records and others documentation for harvested AP; 17. Observe safety and health rules and regulations when performing the task.	4.2. Communication skills; 4.3. Integrity; 4.4. Problem solving skills; 4.5. Time management; 4.6. Commitment.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	Harvesting of AP is performed as per approved standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Occupational safety and health; 4. HACCP principles and regulations.

OCCUPATION	BIOPROCESS AND POST HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CONTROL LOSSES OF AGRICULTURAL PRODUCE (AP) FROM HARVESTING TO STORAGE	**DUTY NO.**	701
TASK TITLE	DETERMINE PROPER MEANS OF TRANSPORT FOR A PARTICULAR HARVESTED AP	**TASK NO**	7012
PERFORMANCE CRITERIA	The person performing this task must be able to determine proper means of transport for a particular AP as per standards and procedures approved by a competent authority.		
RANGE STATEMENT	The task will be performed during transport under the supervision of a Senior Engineer. The following equipment, tools and materials will be needed in performing the task: tracks, forklift, tractor, trays, trailer, jute bags, pallet, weigh balance, P.P.E, loaders.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Establish type of crop to be transported; 2. Establish status of the crop to be transported; 3. Identify quantity of harvested AP for transportation (size, weight) ; 4. Select appropriate tools and equipment for the task; 5. Identify suitable packaging of AP for transportation; 6. Verify infrastructure and security conditions; 7. Identify possible means of transport for a particular AP; 8. Select proper means of transport for a particular AP; 9. Pack properly harvested AP for transportation; 10. Inspect condition of the vehicles; 11. Establish suitable weather condition for transportation; 12. Plan on the route and time for harvested AP to reach a point;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Harvest; 1.2. Load and offload; 1.3. Pack harvested AP. **2.0. Principles** The person must be able to explain the principle of HACCP. **3.0. Theories** The person must be able to explain: 3.1.Perishable crop properties; 3.2.Semi perishable crop properties; 3.3.Non-perishable crop properties; 3.4.Uses of harvesting tools and equipment; 3.5.Various method of harvesting; 3.6.Packaging methods of Aps. **4.0. Essential skills** 4.1. Team work skills; 4.2. Communication; 4.3. Integrity;

13. Conduct proper handling procedures for transportation of harvested AP; 14. Store tools and equipment as per standards and procedures; 15. Complete forms, records and others documentation for transported AP; 16. Observe safety and health rules and regulations when performing the task.	4.4. Problem solving; 4.5. Time management; 4.6. Commitment.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	Proper means of transport for harvested AP is determined as per standards and procedures approved by a competent authority.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POST HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CONTROL LOSSES OF AGRICULTURAL PRODUCE (AP) FROM HARVESTING TO STORAGE	**DUTY NO.**	701
TASK TITLE	MAINTAIN PROPER STORAGE STRUCTURES	**TASK NO.**	7013
PERFORMANCE CRITERIA	The person performing this task must be able to maintain proper storage structures for a particular AP as per standards and procedures approved by a competent body.		
RANGE STATEMENT	The task will be performed on the storage structure under the minimum supervision of a Senior Engineer. The following equipment, tools and materials will be needed in performing the task: pallet, forklift, P.P.E, bags, stationery, baskets, trays, pesticide, broom, mop, moisture meter, hygrometer.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Establish the type of AP to be stored; 2. Verify the status of the storage structure; 3. Select right tools and equipment for the task; 4. Inspect faults regularly in storage structure; 5. Repair any observable faults in storage structure; 6. Clean regularly storage structure; 7. Prepare plan for pest control; 8. Conduct pest control; 9. Monitor necessary conditions for storage structure (e.g., humidity, temperature, ventilation, light) ; 10. Clean tools and equipment; 11. Store tools and equipment as per standards and procedures; 12. Complete forms, records and others documentation for stored AP;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Store AP; 1.2. Obtain moisture content; 1.3. Control pest; 1.4. Handle tools and equipment. **2.0. Principles** The person must be able to explain the principle of GMPs. **3.0. Theories** The person must be able to explain: 3.1. Proper management of storage structure; 3.2. Pest management. **4.0. Essential skills** 4.1. Teamwork skills; 4.2. Communication; 4.3. Integrity; 4.4. Warehouse keeping; 4.5. Personal hygiene; 4.6. Curiosity;

13. Observe safety and health rules and regulations when performing the task.	4.7. Problem solving.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	Proper Storage structures are maintained as per standards and procedures approved by a competent authority.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POST HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CONTROL LOSSES OF AGRICULTURAL PRODUCE (AP) FROM HARVESTING TO STORAGE	**DUTY NO.**	701
TASK TITLE	PRACTICE PROPER HANDLING PROCEDURES OF STORED AP	**TASK NO**	7014
PERFORMANCE CRITERIA	The person performing this task must be able to practice proper handling procedures of stored AP as per standards and procedures approved by a competent authority.		
RANGE STATEMENT	The task will be performed on the storage structure under the supervision of a Senior Engineer. The following equipment, tools and materials will be needed in performing the task: pallet, forklift, P.P.E, bags, stationery, baskets, trays, pesticide, bloom, mop, moisture meter, hygrometer.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Establish type of AP to be stored; 2. Determine condition of AP to be stored (E.g., check for moisture content) ; 3. Select proper method for storing of a particular AP; 4. Select right tools and equipment for the task; 5. Conduct proper storage of AP; 6. Check quality of stored AP regularly; 7. Practice First In, First Out principle; 8. Inspect faults in storage structure; 9. Repair any observable faults in storage structure; 10. Clean storage structure, tools and equipment regularly; 11. Prepare plan for pest control; 12. Conduct pest control; 13. Monitor conditions of storage structure (e.g., humidity, temperature, ventilation, light) ;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Store AP; 1.2. Obtain moisture content; 1.3. Control pest; 1.4. Handle tools and equipment; 1.5. Rodent control. **2.0. Principles** The person must be able to explain the principles of: 2.1. GMPs; 2.2. FIFO. **3.0. Theories** The person must be able to explain: 3.1. Perishable crop properties; 3.2. Semi perishable crop properties; 3.3. Non-perishable crop properties; 3.4. Various test for stored AP; 3.5. Proper arrangement of AP; **3.6.** Pest management. **4.0. Essential skills**

14. Store tools and equipment as per standards and procedures; 15. Complete forms, records and others documentation for stored AP; 16. Observe safety and health rules and regulations when performing the task.	4.1. Teamwork skills; 4.2. Communication skills; 4.3. Integrity; 4.4. Warehouse keeping; 4.5. Personal hygiene; 4.6. Curiosity; 4.7. Problem solving skills.
DESCRIPTION OF THE END PRODUCTS/SERVICE	Proper handling procedures of stored AP is practiced as per standards and procedures approved by a competent authority.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POST-HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	MAINTAIN KEY PERFORMANCE INDICATORS (KPIs') FOR PRODUCTION PROCESS OF AGRICULTURAL PRODUCE (AP)	**DUTY NO**.	702
TASK TITLE	MONITOR PRODUCTION TARGET OF PROCESSED AP	**TASK NO.**	7021
PERFORMANCE CRITERIA	The person performing this task must be able to monitor the production target of processed AP as per given standards and operation procedures.		
RANGE STATEMENT	The task will be performed in the factory under supervision of a Senior Engineer. The following equipment, tools and materials will be needed in performing the task: mechanical gloves, mask, hair nets, reflectors, weigh balance, timer, helmet, safety boot, industrial coat, overcoat, jute bags.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Identify output target to be attained; 2. Select the required materials, tools and equipment needed to perform the task; 3. Obtain weight of the AP to be processed; 4. Inspect processing machines of AP; 5. Record exactly time each processing machines started to operate; 6. Record downtime for each processing machines in production line; 7. Observe the quality of AP and Processed product; 8. Obtain weight of by-products; 9. Obtain weight of waste produced; 10. Record the weight of the processed product;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Optimize the production; 1.2. Operate the processing machine; 1.3. Carry out production calculations; 1.4. Carry out samples on production line; **2.0. Principles** The person must be able to explain the principles of: 2.1. GMP; 2.2. HACCP; 2.3. Machine's operation. **3.0. Theories** The person must be able to explain: 3.1. Different Types of processing machines; 3.2. Processing of Agricultural produce; 3.3. Quality assurance; 3.4. Food safety; 3.5. Properties Agricultural produce; 3.6. Material and energy balance.

11. Record time taken to accomplish the production; 12. Observe safety and health rules and regulations when performing the task; 1. Observe Good Manufacturing Practices (GMPs) while performing the task; 2. Practice HACCP on a particular processed AP while performing task; 3. Complete production reports; 4. Verify all checklist; 5. Keep the factory clean and organized.	**4.0. Essential skills** 4.1. Team work skills; 4.2. Communication skills; 4.3. Integrity; 4.4. Computer skills; 4.5. Measurement and units; 4.6. Good data gathering skills; 4.7. Readiness to implement knowledge; 4.8. Time management skills; 4.9. Linear Programming.
DESCRIPTION OF THE END PRODUCTS/SERVICE	Production target of a processed AP is monitored as per given standard operating procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Occupational safety and health; 4. ISO standards; 5. National standards; 6. Standard Operating Procedures (SOPs).

OCCUPATION	BIOPROCESS AND POST-HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	MAINTAIN KEY PERFOMANCE INDICATORS (KPIs') FOR PRODUCTION PROCESS	**DUTY NO.**	702
TASK TITLE	MONITOR OPERATIONS IN THE PRODUCTION PROCESS	**TASK NO**	7022
PERFORMANCE CRITERIA	The person performing this task must be able to monitor operations in the production process as per given standard operating procedures.		
RANGE STATEMENT	The task will be performed in the factory under supervision of a Senior Engineer. The following equipment, tools and materials will be needed in performing the task: mask, hair nets, reflectors, timer, helmet, safety boot, industrial coat, overcoat, operating manuals.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Set activities/operations to be carried out; 2. Define key performance procedures for each activity/operation; 3. Practice standard operation procedures; 4. Observe operator's performance; 5. Observe performance of processing machines; 6. Troubleshoot processing machines and equipment; 7. Control downtime of processing machines; 8. Observe health and safety when performing the task; 9. Observe Good manufacturing practices while performing the task; 10. Practice HACCP stepson a particular processed AP while performing task; 11. Record operating time for each production process;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Optimize process; 1.2. Operate the processing machine; 1.3. Diagnose fault of processing machine; 1.4. Carry out production calculations. **2.0. Principles** The person must be able to explain the principles of: 2.1.GMP; 2.2.HACCP. **3.0. Theories** The person must be able to explain: 3.1. Basic mechanics; 3.2. KPI's for monitoring production process; 3.3. Quality assurance and food safety; 3.4. Processing of Agricultural produce; 3.5. Operation of different processing machines. **4.0. Essential skills** 4.1. Team work skills; 4.2. Communication skills; 4.3. Integrity;

12. Record operation's output for each production process; 13. Compare output for each production process and the set target; 14. Report any anomaly to supervisor; 15. Clean the working tools and equipment; 16. Store tools and equipment appropriately; 17. Keep the factory clean and organized.	4.4. Computer skills; 4.5. Measurement and units; 4.6. Good data gathering skills; 4.7. Readiness to implement knowledge; 4.8. Time management skills.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	Operations in the production process are monitored and performed as per given standards and operating procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. Standard Operating Procedures (SOPs) ; 3. Extent of responsibility; 4. Good manufacturing practice; 5. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POST-HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	MAINTAIN KEY PERFOMANCE INDICATORS (KPIs') FOR PRODUCTION PROCESS	**DUTY NO.**	702
TASK TITLE	ASSESS OVERALL EFFECTIVENESS OF MACHINE, EQUIPMENT AND LABOUR	**TASK NO**	7023
PERFORMANCE CRITERIA	The person performing this task must be able to assess overall effectiveness of machine, equipment and labour as per given standards and procedures.		
RANGE STATEMENT	The task will be performed in the factory under supervision of a Senior Engineer. The following equipment, tools and materials will be needed in performing the task: mask, hair nets, reflectors, timer, helmet, safety boot, industrial coat, overcoat, operating manuals, mechanical gloves, stationeries.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select right tools and equipment for the task; 2. Check quantity of processed AP; 3. Analyse quality of a processed AP; 4. Observe the quantity of waste produced; 5. Observe time taken by a processing machine to accomplish the process; 6. Record time taken to accomplish the process; 7. Record time taken by operator on processing machine; 8. Observe health and safety when performing the task; 9. Analysis and report assessment results; 10. Clean working tools and equipment;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Calculate overall labour effectiveness; 1.2. Operate the processing machine; 1.3. Overall equipment effectiveness; 1.4. Calculate labour's productivity. **2.0. Principles** The person must be able to explain the principles of 2.1. Integration of Overall Equipment Effectiveness (OEE) and reliability; 2.2.GMPs. **3.0. Theories** The person must be able to explain: 3.1. Operation of different processing machines; 3.2. Efficiency of operating machines; 3.3. Total effective equipment performance (TEEP) ; 3.4. Basic mechanics; 3.5. Material sciences.

11. Store tools and equipment appropriately; 12. Clean working space.	**4.0. Essential skills** 4.1. Team work skills; 4.2. Communication skills; 4.3. Integrity; 4.4. Computer skills; 4.5. Measurement and units; 4.6. Good data gathering skills; 4.7. Readiness to implement knowledge; 4.8. Time management skills.
DESCRIPTION OF THE END PRODUCTS/SERVICE	Assessment of overall effectiveness of machine, equipment and labour is performed and the assessment report is produced as per given standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POSTHARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	ESTABLISH LOSSES IN PRODUCTION LINE FOR AGRICULTURAL PRODUCE (AP)	**DUTY NO.**	703
TASK TITLE	ANALYZE WASTE TO ESTABLISH NUMBER OF LOSSES IN AP PRODUCTION LINE	**TASK NO.**	7031
PERFORMANCE CRITERIA	The person carrying out this task must be able to apply knowledge and skills to analyse waste to establish losses in AP production line as per given standards.		
RANGE STATEMENT	The task will be performed in production line under the supervision of a Senior Engineer. The following tools, equipment and safety gear will be needed to accomplish this task: Weigh balance, gloves, industrial boot, hair net, ear plugs, mask, coverall, overcoat, reflectors, jute bags, polymer bags, stationery.		

EVIDENCEREQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select right tools and equipment for the task; 2. Weigh raw materials inflow; 3. Collect defects product in the production line; 4. Weigh tangible waste collected; 5. Weigh finished product; 6. Weigh by-product; 7. Observe flow of every material to the next operation unit in the production line; 8. Perform material balance; 9. Determine losses in waste produced; 10. Handle the waste collected; 11. Keep records of the measurements and results; 12. Follow set procedures in collecting wastes from the production line; 13. Store tools and equipment as per standards and procedures; 14. Clean working environment;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Determine wastes in production line; 1.2. Identify the manufacturing wastes; 1.3. Carry out measurements; 1.4. Perform material balance. **2.0. Principles** The person must be able to explain the principles of: 2.1. First in first out (FIFO) ; 2.2. Operating weigh balance. **3.0. Theories** The person must be able to explain: 3.1. Types of manufacturing wastes; 3.2. Ways to collect wastes from production line; 3.3. Material and Energy balance; 3.4. Law of conservation of mass; 3.5. Unit operation I/Mechanical Processing of agricultural produce; 3.6. Carefulness in following procedures of collecting wastes from production line.

15. Observe safety and health rules and regulation when performing the task; 16. Complete forms, records and other documentation.	**4.0. Essential skills** 4.1. Algebra; 4.2. Material balance; 4.3. Communication skills; 4.4. Good data gathering and analysis skills; 4.5. Baseline problem solving and analysis skills; 4.6. Report writing; 4.7. Integrity; 4.8. Trustworthy; 4.9. Measurement.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	Number of losses in waste produced in the production line is established as per given standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. Safe handling and disposal of waste; 3. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POSTHARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	ESTABLISH LOSSES IN PRODUCTION LINE OF AGRICULTURAL PRODUCE (AP)	**DUTY NO.**	703
TASK TITLE	ANALYZE LOSSES OF AP RELATED TO PROCESSING MACHINE	**TASK NO.**	7032
PERFORMANCE CRITERIA	The person carrying out this task must be able to apply knowledge and skills to analyse losses of AP related to processing machine as per given standards and procedures.		
RANGE STATEMENT	The task will be performed during production process under supervision of a Senior Engineer. The following tools, equipment and safety gear will be needed to accomplish this task: safety goggles, helmet, industrial coat, gloves, ladder, safety boots, replaceable tools (e. g. spray gun etc.), machine's maintenance tool box (screwdriver set, tape measure, toolbox, hammer, duct tape, flashlight, set of pliers, utility knife), operating manual, stopwatch and stationery.		

EVIDENCEREQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the amount of inflow; 2. Obtain amount of throughput generated from the processing machine; 3. Inspect and monitor machine parts wear and tear; 4. Check machine functionality if necessary; 5. Schedule and perform regular inspections of equipment; 6. Observe unplanned stops; 7. Observe planned stops; 8. Observe small stops; 9. Observe slow cycles; 10. Observe production defects; 11. Observe start-up defects; 12. Observe any defective equipment parts; 13. Observe operating procedure of the machine;	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Determine wastes in production line; 1.2. Identify the manufacturing wastes; 1.3. Carry out measurements; 1.4. Diagnose fault; 1.5. Use the machine and equipment; 1.6. Take records. **2.0. Principles** The person must be able to explain the principles of: 2.1. Machine's operations; 2.2. Operating equipment. **3.0. Theories** The person must be able to explain: 3.1. Mechanics of machine; 3.2. Properties of materials; 3.3. Material and Energy balance; 3.4. Law of conservation of mass;

14. Diagnose fault in the processing machine; 15. Complete forms, records and other documentation; 16. Analyse overall equipment effectiveness (OEE); 17. Clean the work space and machine; 18. Report the problem; 19. Observe safety and health rules and regulations when performing the task; 20. Store tools and equipment in a proper area.	3.5. Mechanical processing of Agricultural Produce. **4.0. Essential skills** 4.1. Teamwork skills; 4.2. Time management; 4.3. Interpersonal skills; 4.4. Maintaining the normal work flow; 4.5. Computer skills; 4.6. Report writing; 4.7. Communication skills; 4.8. Good data gathering and analysis skills; 4.9. Baseline problem solving and Analytical skills.
DESCRIPTION OF THE END PRODUCTS/SERVICE	Analysis of machine related losses in the production line is performed as per given standards and procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POSTHARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	ESTABLISH LOSSES IN PRODUCTION LINE OF AGRICULTURAL PRODUCE (AP)	**DUTY NO.**	703
TASK TITLE	DETERMINE QUALITATIVE LOSSES OF AP	**TASK NO.**	7033
PERFORMANCE CRITERIA	The person carrying out this task must be able to apply knowledge and skills to analyse qualitative losses of AP as per given standards and procedures.		
RANGE STATEMENT	The task will be performed during production on processing AP under minimum supervision of a Senior Engineer. The following tools, equipment and safety gear will be needed to accomplish this task: safety goggles, industrial coat, gloves, safety boots.		

EVIDENCEREQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select right tools and equipment for the task; 2. Obtain quality of the received AP; 3. Observe trial/dummy production 4. Observe retention time; 5. Observe operating procedures; 6. Observe physical damage of the end product; 7. Test nutrient level of the end product; 8. Verify against the standards; 9. Clean the work space and machine; 10. Report the problem; 11. Observe safety and health rules and regulations when performing the task.	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Take samples of processed product; 1.2. Perform quality test. **2.0. Principles** The person must be able to explain the principle of sampling. **3.0. Theories** The person must be able to explain: 3.1. Quality test; 3.2. Quality control and quality assurance. **4.0. Essential skills** 4.1. Measurement and units; 4.2. Trustworthy; 4.3. time management; 4.4. Teamwork.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	AP losses related to quality are determined as per given procedures and standards.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. ISO standards on quality test;

	2. W;H;O and GMP guidelines for quality control; 3. National Standards (TBS – Tanzania, KEBS – Kenya, UNBS - Uganda); 4. Safe handling of equipment and tools; 5. Occupational safety and health; 6. Extent of responsibility.

OCCUPATION	BIOPROCESS AND POST HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DEVELOP PACKAGING FOR AGRICULTURAL PRODUCE (AP) AND PROCESSED PRODUCTS	**DUTY NO.**	704
TASK TITLE	SELECT MATERIALS FOR AGRICULTURAL PRODUCE (AP) AND PROCESSED PRODUCTS PACKAGING	**TASK NO**	7041
PERFORMANCE CRITERIA	The person performing this task must be able to select packaging materials for Agricultural Produce (AP) and processed products as per standards approved by a competent authority.		
RANGE STATEMENT	The task will be performed in the factory under minimum supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: stationery, internet, package material (plastic, cardboard, metal sheet, glass), computer.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able do the following: 1. Obtain clear and detailed information about product to be packed; 2. Analyse characteristics of product to be packed; 3. Identify potential purpose of packaging material; 4. Identify packaging methods; 5. Choose packaging materials 6. Observe conformity with the standards; 7. Store tools and equipment as per standards and procedures; 8. Clean working area; 9. Observe safety and health rules and regulations when performing the task; 10. Complete forms, records and others documentation.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to select packaging materials. **2.0 Principle** The person must be able to explain the principle of Elasticity. **3.0 Theories** The person must be able to explain: 3.1 Packaging methods; 3.2 Characteristics of AP/processed AP; 3.3 Characteristics of materials (material science); 3.4 Packaging techniques; 3.5 Various types of packaging; 3.6 Basic microbiology knowledge **4.0. Essential skills** 4.1 Teamwork skills; 4.2 Computer skills; 4.3 Curiosity; 4.4 Communication skills; 4.5 Integrity;

	4.6 Aseptic skills.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	Packaging materials for AP and processed products are selected as per approved standards.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. ISO standard; 3. National standard; 4. Extent of responsibility; 5. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POST-HARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DEVELOP PACKAGING FOR AP AND PROCESSED PRODUCT	**DUTY NO.**	704
TASK TITLE	DESIGN PACKAGING FOR AP AND PROCESSED PRODUCTS	**TASK NO**	7042
PERFORMANCE CRITERIA	The person performing this task must be able to design packaging for AP and processed product as per approved standards and procedures.		
RANGE STATEMENT	The task will be performed at the workshop under the supervision of an Engineer. The following equipment, tools and materials will be needed in performing the task: packaging materials (plastics, wood, metal sheet, paper, cardboard), PPEs', computers, stationaries, electrodes, welding machines, engineering toolkit, grinding disk, cutting disk, vice, tape measure, Vanier calliper and mould.		

EVIDENCE REQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able do the following: 1. Prepare packaging materials to be used; 2. Carry out design calculations; 3. Provide engineering drawing; 4. Select packaging materials required for design; 5. Select right tools and equipment required for fabricating AP packages; 6. Fabricate parts of packaging; 7. Assemble fabricated parts; 8. Test the fabricated package of AP; 9. Record the test results; 10. Observe health and safety when performing the task; 11. Clean working tools and equipment; 12. Store tools and equipment appropriately; 13. Keep the workshop clean and organized.	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Use Workshop tools and equipment; 1.2. Operate grinding and cutting machine; 1.3. Use Computer Aided Design (CAD); 1.4. Carry out design calculations; 1.5. Select packaging materials; 1.6. Design a package for AP. **2.0. Principles** The person must be able to explain the principles of: 2.1. Coupling; 2.2. Cohesion; 2.3. Release/reuse equivalence; 2.4. Open/Closed; 2.5. Assembling and disassembling of equipment. **3.0. Theories** The person must be able to explain: 3.1. Engineering drawings; 3.2. Properties of packaging materials; 3.3. Types of Packaging materials; 3.4. Types of packaging;

	3.5. Function of packaging; 3.6. Design criteria; 3.7. Programmable Logic Control (PLC); 3.8. Properties of Agricultural produce and processed product. **4.0. Essential skills** 4.1. Team work skills; 4.2. Creative and innovation skills; 4.3. Passionate; 4.4. Patience; 4.5. Measurements and units; 4.6. Communication skills; 4.7. Integrity; 4.8. Algebra; 4.9. Computer skills; 4.10. Problem solving skills; 4.11. Analytical skills.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	Design of packaging for AP and processed product is performed as per approved standards.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about** 1. Safe handling of equipment and tools; 2. Extent of responsibility; 3. Good manufacturing Practices; 4. Occupational safety and health.

OCCUPATION	BIOPROCESS AND POSTHARVEST ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DEVELOP PACKAGING FOR AP AND PROCESSED PRODUCTS	**DUTY NO.**	704
TASK TITLE	EVALUATE PACKAGING FOR AP AND PROCESSED PRODUCTS	**TASK NO**	7043
PERFORMANCE CRITERIA	The person performing this task must be able to apply knowledge and skills to evaluate packaging for various AP and processed products as per given standards and procedures.		
RANGE STATEMENT	The task will be performed at the testing laboratory, under the supervision of an Engineer. The following tools, equipment and safety gear will be needed to accomplish this task: package testing machine, operation manuals gloves, masks, computer, stationery and printer.		

EVIDENCEREQUIREMENTS	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able do the following: 1. Select right tools and equipment for the task; 2. Identify types of packaging materials used; 3. Determine purpose of packaging; 4. Identify test parameters to undertake on the packaging; 5. Conduct test on packaging 6. Record test results for tested packaging; 7. Verify the test results against standards; 8. Store test equipment appropriately; 9. Clean working area.	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1 Test packaging; 1.2 Carry out testing calculation. **2.0. Principles** The person must be able to explain the principles of: 2.1 Operating packaging machine tester; 2.2 Open/close; 2.3 Release/reuse equivalence. **3.0. Theories** The person must be able to explain: 3.1 Different types of packaging options to use; 3.2 Function of packaging; 3.3 Testing methods for packaging materials; 3.4 Parameters to evaluate packaging; 3.5 Stages in evaluating packaging; 3.6 Packaging materials specification; 3.7 Different programming languages. **4.0. Essential skills** 4.1 Readiness to implement knowledge; 4.2 Team work;

	4.3 Communication skills; 4.4 Customer-oriented skills; 4.5 Result oriented way of working; 4.6 Report writing skills.
DESCRIPTION OF THE END PRODUCTS/ SERVICE	Evaluation of packaging for AP and processed products is performed as per approved standards.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. ISO standards on packaging test; 2. W;H;O and GMP guidelines for quality control of packaging material; 3. National Standards (TBS – Tanzania, KEBS – Kenya, UNBS - Uganda); 4. Handling of equipment and tools; 5. Occupational safety and health.

TABLE 1: DACUM CHART FOR BIOPROCESS AND POST HARVEST ENGINEERING – LEVEL 7

DUTIES	TASK	ENABLERS
1.0. Control losses of agricultural produce (AP) from harvesting to storage	1.1. Conduct proper harvesting of a particular AP. 1.2. Determine proper means of transport for a particular harvested AP. 1.3. Maintain proper storage structures. 1.4. Practice proper handling procedures of stored AP.	**General skills and knowledge** • Knowledge on governmental regulatory programs and HACCP • Knowledge of OSHA and safety standards • Ability to use manufacturing manuals • Readiness for implementation of knowledge • Communication skills **Tools and Equipment** • PPEs such as safety boots, gloves, glasses etc. • Cleanness and office supplies **Materials** • Manufacturing manuals • Practice procedures manuals **Worker behaviours** • Awareness of safety at work place • Team work • Show responsibility towards equipment and environment

DUTIES	TASK	ENABLERS
2.0. Maintain key performance indicators (KPIs') for production process of agricultural produce (AP)	2.1. Monitor production target of processed AP. 2.2. Monitor operations in the production process. 2.3. Assess overall effectiveness of machine, equipment and labour.	**General Skills and knowledge** • Skills and knowledge on Post harvest handling • Storage technologies • Pest management control **Tools and Equipment** • Silos, bags, pallets, trays etc. • Combine harvester machine • Thermometer, humidity meter • Crain, focal lift **Materials** • Fuel **Worker behaviours** • Team work spirit • Commitment • Trustworthy • Time management skills
3.0. ' Establish losses in production line for agricultural produce (AP)	3.1. Analyze waste to establish number of losses in AP production line. 3.2. Analyze losses of AP related to processing machine. 3.3. Determine qualitative losses of AP.	**General skills and knowledge** • Taking measurement • Communication skills • Good data gathering skills **Tools and Equipment** • Weigh balance • Timer • Engineering Toolbox **Materials** • Lubricant

DUTIES	TASK	ENABLERS
		Worker behaviours • Team work • Time management • Readiness to implement knowledge
4.0. Develop packaging for agricultural produce (AP) and processed products	4.1. Select materials for agricultural produce (AP) and processed products packaging. 4.2. Design packaging for AP and processed products. 4.3. Evaluate packaging for AP and processed products. 4.4. Design packaging materials of AP and processed products. 4.5. Evaluate packaging materials for AP and processed products.	**General skills and knowledge** • Material balance • Mathematics knowledge • Taking measurement • Communication skills • Good data gathering and analysis skills • Baseline problem analysis and solving skills **Tools and Equipment** • Weigh balance • Spanner, pliers etc. **Worker behaviours** • Trustworthy • Commitment • Readiness to implement knowledge