

WORK STUDY ON COCOYAM AND PLANTAIN FLOUR PRODUCTION FOR FUFU FLOUR PRODUCTION (TECHNICAL REPORT)

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EXECUTIVE SUMMARY

Work study involves identifying effective way of doing work, thus a means to increase productivity in manufacturing environments. In view of this, a work study assessment using the time study option was carried out by Food Technology Research Division of CSIR-Food Research Institute, Ghana. This activity was carried on 15th March, 2017 and 18th April, 2017 for plantain (*Musa spp.*) and cocoyam (*Colocasia esculenta*) respectively at the processing laboratory, CSIR-Food Research Institute. The aim of this assessment was to identify the time taken as well as provide the work rate for each stage within the production chain. The processing unitd of operation within the production chain involved sorting, peeling, washing, slicing and blanching for both samples (cocoyam and plantain). Among the various stages of production, blanching recorded the highest work rate with peeling and slicing accounting for relatively higher amount of time spent. Low number of employees at any stage results in high work rate. Further, unproductivity activities during processing and absence of appropriate technology result in higher amount of time for completing any particular stage of processing.

1.0 INTRODUCTION

1.1 Background to the study

Work study involves analyzing work methods and the equipment applied in performing jobs at standardized and optimized level (Raut *et al.*, 2014). Furthermore, work study mostly assesses the way work is organized, along with collecting information about the processes involved.

Objectively, work study outlines the most effective way of working. This involves systematically developing a new and better method of production with the aim of increasing productivity by ensuring the efficient use of human, machine and material resources (Mishara, 2015; Vijaya, 2012). There are two methods of work study, namely; method study and time study. However, the assessment focused on the time study because the method study has been assessed already.

Time study is a technique of work measurement used to evaluate the time required to carry out a given activity at a defined standard of performance (Chandra, 2013). It is a direct and continuous observation of a task, using a time-keeping device like stop-watch, computer-assisted electronic stopwatch and video-tape camera to record the time taken to accomplish a task (Raut *et al.*, 2014; Vijaya, 2012).

The purpose of the study was to record the labour involved, time taken to perform the various activities within the production chain and provide the work rate of these activities.

2.0 METHOD AND METHODS

2.1 Study area

The study was conducted at the CSIR-Food Research Institute, Ghana.

2.2 Materials

The investigation focused on the production of cocoyam and plantain, using 388 kg and 531 kg of cocoyam and plantain respectively. Samples of cocoyam and plantain used for the study were sourced from markets in Begoro (Eastern region, Ghana) and Opogu (Ashanti region, Ghana) respectively. A stop clock was used to record the actual time taken by the workers under observation to perform various elements of the work or task.

2.3 Methods

2.3.1 Work measurement

This was conducted for measuring work in process using a stop watch to analyze a specific process by qualified workers in an effort to find the most efficient ways in terms of time. Before making this time study each operation was broken into definite number of elements and after recording the time, the worker's performance time (level) was computed. The study was conducted on 15th March, 2017 for plantain and 18th April, 2017 for cocoyam.

2.3. 2 Sorting

Both raw materials were sorted to ensure that wholesome¹ samples were selected for the study.

2.3.3 Peeling and slicing

For cocoyam and plantain, peeling and slicing began at 6:30 am and 7: 32 am respectively. End time for peeling and slicing (cocoyam) was 3:26 pm and 3:53 pm respectively. For plantain, end time for both peeling and slicing were 4:13 pm.

2.3.4 Blanching

Blanching for cocoyam and plantain began at 12: 05 pm and 12: 19 pm while the end time was 4: 05 pm and 4: 19 pm respectively. An average of 3 minutes was used in blanching 10.5 kg of sliced cocoyam while 15 kg of sliced plantain took 2 minutes to blanch.

2.4 Work rate (WR)

Work rate was estimated using the expression:

$$\frac{\text{Kilogram}}{\frac{\text{person}}{\text{Hours}}}$$

¹ Samples without holes

3.0 RESULTS AND DISCUSSION

3.1 Time study

The unit operations applied in handing out plantain and cocoyam prior to obtaining flour were peeling, slicing and blanching (Tables 3.1 and 3.2). The number of workers, hours spent and weight of sample processed was investigated. The samples are outlined in Tables 3.1 and 3.2 respectively.

Table 1: Time study parameters obtained from plantain processing

Process	No of persons	Hours spent	Weight (kg)
Peeling	3.00	8.65	531.00
Slicing	4.00	8.65	327.00
Blanching	1.00	2.00	327.00

Table 2: Time study parameters obtained from cocoyam processing

Process	No of persons	Hours spent	Weight (kg)
Peeling	4.00	8.90	388.00
Slicing	2.00	9.40	295.00
Blanching	1.00	1.40	295.00

The relatively high amount of time spent in slicing (regarding cocoyam) could be assigned to the low number of workers. Also, engagement in informal conversations² a could be factor for the observed high amount of time invested per process for each sample.

² Personal conversations including household and reproductive issues



Picture 1: Employees (both casual and formal) peeling and slicing cocoyam at CSIR-Food Research Institute



Picture 2: Blanching of cocoyam by an employee at Food Research Institute

3.3 Work rate (WR)

The calculated work rate for both samples (cocoyam and plantain) within each stage of processing is provided in Table 3.3. From Table 3.3, the blanching recorded the highest work rate while peeling recorded the least work rate (in both samples). The variation in work rate could be attributed to the number of workers assigned to each stage. Thus, the higher the number of workers, the lower the work rate or vice versa. Further, the high work rate for blanching could be due to lack of appropriate equipment for blanching and the needed skills. Hence, provision of skill development training for workers engaged in these processes should be institutionalized.

Table 3: Estimated work rate (WR) for cocoyam and plantain processing

Process	WR (Cocoyam)	WR (Plantain)
Peeling	10.90	20.46
Slicing	15.69	9.45
Blanching	210.71	163.50

4.0 CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The study has revealed a comparatively higher work rate for blanching. Many of the employees engage in nonproductive comments during the process period which lengthens the needed time for job completion.

4.2 Recommendation

Per the results from the study, the following have been recommended:

1. Number of employees at each stage of processing should be increased to increase productivity.
2. Employees should be exposed to training on skill enhancement and time management.
3. Standard work rate should be estimated to ensure that activities within the processing chain are time bound – a proxy for productivity enhancement.

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END OF REPORT