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A Survey of Cassava Processing Machinery in Oyo State

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Abstract: Survey of cassava processing machinery was carried out to evaluate the followings: different cassava processing machinery, the most acceptable machine, effect of cost of machinery on the processors and to determine whether sex of machine operator is dependent on the type of prime mover in Oyo State, Nigeria. This information was gathered using structured questionnaires, which was designed and administered between March 2003-May 2003. A total of 212 machines were observed, grating, 79 (37.6%) dewatering press, 61 (28.8%), chipping, 8 (3.8%), sifter 7 (3.3%), fryer, 1 (0.5%), milling, 51 (24.1%). Diesel engine (80.4%) was the most prominent prime mover. Greater numbers of processing centres were owned by individual. The relationship between the processors and the machines manufacturers was poor. More than 40% of the machines observed had been abandoned and these could be attributed to adulterated spare parts, operation cost, inexperience machine repairers, untrained machine operators and quality of the construction materials. The sex of the machine operators was dependent on the type of prime mover. Diesel engines were operated majority by males while petrol engines were mostly operated by females. The detailed analyses of the observed cassava processing machines were discussed and recommendations were made based on the finds of this study.

Key words: Cassava processing machines % Machine cost % Machine operators % Nigeria

INTRODUCTION

Cassava is extremely perishable, harvested tubers must be processed to curb post harvest losses [1]. Allocation of resources by federal, state and local governments to the development of cassava production and processing be taken seriously because of its importance for national and household food security. The large untapped domestic market for cassava as raw material in the industrial sector, income generation through diversification and expansion of cassava development into new growth market for ethanol, starch, livestock feed and flour as substitute for various imported items [2].

Cassava processing is constrained by a lack of steady supply of tubers throughout the year, high transport cost to processing centres, inadequate processing equipment and low returns from small-scale processing [3-4]. Different types of cassava processing machines are produced locally such as cassava grater, sifter, watering press, garri fryers, cassava chippers, batch dryer, pelleting machines and cassava starch mill. These machines are used to produce garri, cassava flour, chip, tapioca, chink-wange, cassava beer, pellet for livestock, bread and industrial gum. The products such as cassava chips, pellets, fresh tubers, and cassava gum have considerably export potentials [5-6].

Mechanization of cassava processing operations will enhance human capacity, leading to intensification and increase in production. The present

upsurge experience in the demand of cassava products both locally and abroad has begun to overshoot the price of garri which is the most popular food derived from cassava. The cassava processing operations have been reported by many authors as labors intensity. The women and children are the major producers [7]. Poor quality of locally produced cassava products has been traced to problem associated with peeling, grating, milling, dewatering, toasting, sifting etc which are labour intensive. It was reported that garri processing takes an average of 90 hours to process 100 kg of garri per person. It was further iterated that 65% of the total time could be spent on peeling and 25 percent in roasting to [8]. To alleviate some of these problems encountered by

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traditional processors, various processing machines are developed for these operations such as peeling, grating of various sizes, pressing, sieving, frying, chipping and milling.

MATERIALS AND METHODS

Survey of cassava processing machinery in Oyo State using Lagelu, Ibarapa and Oyo Local Government Areas as a case study was conducted by means of a structured questionnaire, administered through a participatory learning technique. Each of the three Local Government Area was divided into four zones. Furthermore, each zone was divided into four locations. Thus, a total of 48 processing centres were visited. Care was taken to include semi-urban towns in the sample to obtain information on the rural-urban interface of cassava processing machines. Some of the issues addressed by the questionnaires include: (1) the different type of machine (2) most acceptable machine (3) effect of cost of machine on the processors, (4) cost of maintenance and services (5) gender relationship on the cassava processing operations, etc. The data was subjected to quantitative statistical analyses using computer software (SPSS, 1993) [9].

RESULTS AND DISCUSSION

A total of 48 processing centres were visited in Oyo, Ibarapa and Lagelu Local Government areas of Oyo State, Nigeria. A cursory look at Table 1 shows a total of 212 cassava processing machines were observed, prominent among the machines were grater (37.6%), dewatering press (28.8%) and milling machine (24.1%). Peeling as a unit operation in cassava processing presented a considerable problem and was still largely undertaken mostly by women and children using knife [10, 11]. The only one peeler, all washing machines as well as fryer had been abandoned due to high operation cost. Cassava chippers and sifters were well utilized for production of flour and garri, respectively. The diesel engine was the most popular prime mover (82.1%) observed in all the processing centres and capacity ranged from (3.5-10 kw), the petrol and electric engine ranged from (2.3-5 kw) (Table 2). On spot assessment revealed that more than 90% of petrol and electric engine attached to machines were operated by women while diesel engine attached to machines were mainly operated men.

Table 1: Summary of cassava processing machining observed during study

Machine type	Total observed Zone 1	Total observed Zone 2	Total observed Zone 3	Total observed machine	Observed machine(%)
Peeler	1	-	-	1	0.5
Washing	1	1	2	4	1.9
Grater	19	32	28	79	37.6
Presser	15	21	25	61	28.8
Chipping	2	-	6	8	3.8
Sifting	1	3	3	7	3.3
Slicing	-	-	-	-	-
Frying	1	-	-	1	0.5
Drying	-	-	-	-	-
Milling	21	12	18	51	24.1

Table 2: Prime mover

Prime mover	No observed	Observed (%)
Diesel engine	78	82.1
Petrol engine	10	10.5
Electric motor	7	7.4

Table 3: A summary of ownership of processing centers

Ownership	Percentage (%)
Individual	65.0
Government	-
Non-Government	3.0
Cooperatives societies	32.0

Table 4: Relationship between the cassava processors and machine manufacturer

Relationship grading	Response (%)
High	0
Moderate	7
Poor	93

Despite some impressive technological achievement through development of new machinery and equipment, cassava processing is still continue to present daunting challenges because the production level of these processors are either cottage or small-scale level. And this is characterized by low level of technology use and poor management leading to the low productivity. Table 3 shows individual ownership of processing centers were predominantly 65% while 32% were owned by cooperatives bodies and 3% were sponsored by non-governmental organizations.

Relationship between the machine operators (i.e. processors) and machine producers revealed that there was virtually no interaction (93%) (Table 4). The locally produced cassava processing machinery and equipment such as cassava graters, sifters, dewatering

Table 5: Reason for abandon machine

Type of machine	No abandoned	Reason: Old age (%)	High operation cost (%)	Availability of spare parts (%)	Repairer (%)	Quality of construction materials (%)
Peeler	1		100			
Grater	21	26	17	8	9	40
Presser	17	11	8	16	53	12
Sifter	3	-	9	4	67	20
Chipping	1		6		34	60
Frying	1		100			
Milling	10	-	2	4	38	56
Diesel engine	24	-	3	10	85	2
Petrol engine	1	-	2	-	93	5
Electric	3	-	56	-	34	7

Table 6: Sex of the cassava processors in the study

Types of operation	Male operators (%)	Female operators (%)
Peeling	8	92
Washing	3	97
Pressing	90	10
Sifting	11	89
Frying	3	97
Drying	4	96
Milling	86	14
Grading	84	16

press, garri fryers, chippers, batch dryers, pelleting machines and cassava starch mill, developed by research institutes, engineers and Nigerians Equipment Manufacturer were not commonly observed with the processors during this study. Interestingly about 85% of the observed machines utilized by processors were produced by artisans and road side welder. These sect of producers had no knowledge of strength of materials and other quantity control assurance “they are copy cart”. No wonder over 40% of the observed machines had been abandoned over a short period of time. The greater number of abandoned machines were observed in individual ownership processing centres (Table 5). Non-governmental assisted bodies ownership only recorded two abandoned machines. On spot evaluation revealed that apart from the quality of the machines, the operators were not trained on how to manage the machines. Some of the processor complained bitterly on adulterated spare parts as well as lack of experience machine repairers.

It was obvious from Table 6 that men predominantly engaged in machine operations while women undertook cassava processing operations that were prominently manual. Peeling, washing, frying, sifting and drying were almost done manually and by women. Women were dominant in operating milling machines powered by petrol engines and electric motors. Women were favourably employed (about 65%) in the cassava processing centres and this was similar to the report of Ajibola [12]. There was high shared of female labour in cassava processing which called for an urgent need for appropriate gender sensitive machines and equipment for cassava processing. Atala *et al.* [13] recorded similar observation in Kaduna State, Nigeria.

CONCLUSION

In all the processing centres visited cottage industry (65%) was owned by individual while small-scale industry was 35% and owned by cooperative and non governmental bodies. None of the processing centres had less than two machines. Grater, dewatering press and milling machine were most prominent. The most acceptable machine and prime mover were grater and diesel engine respectively. More than 80% of machine operators were men. Women were majorly operating machines attached to petrol engines. Women were considerably engaged in any manual operations in cassava a processing such as peeling, washing, sifting, drying and frying. Peeler and fryer were abandoned for high operation cost. Some machines were equally abandoned based on old age, lack of good technicians (repairers), poor construction materials and non-availability of spare parts (mainly adulterated). Also, contributed immensely was lack of technical know-how and training on the part machine operators. The diversification of cassava products, processing and utilization are presently constrained inspite of Nigeria

rating as the world's largest cassava producer for these reasons: in adequate processing machinery and equipment; lack of credit for peasant processors, low returns from small-scale processing, bulkiness and high perishability of the crop.

There is no significant interaction between the processor and machine producers to evaluate problems relating to the machines.

RECOMMENDATION

The locally produced processing machinery and equipment developed by research institutes, engineers and Nigeria Equipment Manufacturers should be jointly demonstrated by processors, relevant research institution and Agricultural Development Programmes (ADP). Processors comment should influence necessary modification and final selection of the processing machinery.

Peeling has been found to constitute a substantial percentage of the total cost of production. Thus, it is pertinent to develop appropriate machine to take care of the constraints experience during peeling operation. Moreso, agronomy research into various cassava varieties that are of uniform size and shape be developed.

The high cost of most of the cassava processing machinery constitute a major hindrance to the acquisition of the readily available machinery. Since the capital investment of the peasant processors is low, they are enjoined to form cooperative bodies so as to buy communally those machinery they lacked. Provision of basic infrastructure amenities such as electricity, portably water, accessible roads and filling stations will not only go a long way to improve the standard of living of rural farmers and processors. It will also serve as encouragement for the processors to adopt machinery using electricity and diesel as source of power.

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