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Application of Action Research Methodology in Improving the Processing Quality of Local Rice in the Dadin-Kowa Community of Gombe State Nigeria

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Abstract

Dadin Kowa community of Gombe State is noted for rice production due to the presence of dams that ensure all year rice production. However, low patronage and high price of local rice in local markets are putting many farmers and women processors out of business. The paper shares results of an action research process that led to the determination of rice consumer preferences and strengthening of women processors group to improve processing quality of local rice. Forty-seven respondents were sampled using purposive and snow balling sampling techniques to provide views on consumers' preference for rice. Frequencies and percentages were used to analyse and describe the results of the study. The study concluded that paddy rice contains 0.21% stones and sand which could be eliminated using a destoner. Furthermore, a locally manufactured wooden winnower reduces winnowing time by 25 minutes and improves purity by 20% when compared to traditional winnowing process. The processed rice from the action methodology process received 30 and 16 point difference for appearance and acceptability by consumers respectively when compared to the traditional method. Finally, an extra income of ₦2400 was realised per 100kg bag of improved rice. Both the study methodology and conclusions have implications for agricultural training and extension delivery, which together help forge functional linkages among the major sub-systems of the agricultural knowledge systems. Resultantly, clientele's experience is integrated into total learning process, thereby entraining the planned change.

Key Words: Action Research Methodology, Rice Processing, Quality of rice

BACKGROUND AND OBJECTIVES

Rice (Oryza Sativa L) is one of the important major cereal crops of the world. Various initiatives have been provided by African governments with support from bilateral partners aimed at achieving self sufficiency in local rice production. In Nigeria for example, the Federal Government provided subsidy on basic farm inputs (improved rice varieties and fertilizer) for rice farmers under the presidential initiative and banned rice importation in 2006 so as to promote local rice production. Post harvest handling and processing continue to be a major problem hindering rice production. Despite the availability of simple, affordable and improved post harvest technology equipment to reduce or even remove labour drudgery and amount of time spent by women processors, limited extension services have been blamed for not reaching women processors (Oniang'o, 1999). The inability of the extension service to transfer available technologies is often blamed on insensitivity of training programmes provided by institutions of higher learning to future work environment of extension workers and circumstances facing their clients (i.e. farmers) (Opio-Odongo, 2000).

The action research-oriented projects called Supervised Enterprise Projects (SEPs) have been constituted as the nerve-centre of the University of Cape Coast B.Sc. Agricultural Extension programme for mid-career extension staff to reduce the discrepancy between the training and the various tasks the extension staff are expected to perform in their work environments after their training. After one semester in-residence instruction on campus, students return to their place of employment to undertake SEPs.

This paper argues the case for application of action research in addressing the problem of poor post-harvest handling and processing of rice by women processors in Dadin Kowa community of Gombe State in Nigeria. Gombe State is one of the leading states in rice production in Nigeria due to the presence of two irrigation dams at Dadin Kowa and Balanga which ensure all year round rice production. Second, the paper contributes to the understanding and experience of how higher agricultural institutions are making their curricula in training of future professionals more responsive to demands of the clients.

Conceptual Framework

Action research simultaneously assists in practical problem-solving and expands the frontiers of scientific knowledge, as well as enhancing the competencies of the respective actors. It is performed collaboratively in an immediate situation using data feedback in a cyclical process aiming at an increased understanding of a given social situation. Furthermore, it is primarily applicable for the understanding of change processes in social systems and undertaken within a mutually acceptable ethical framework (Hult and Lennung, 1980). Susman (1983) strongly argues that action research should link theory and practice, thinking and doing, achieving both practical (action) and research objectives. The "Action" and "Research" emphasis of action research are complementary. The former is the practice orientation and is expected to bring about a change in an organization or

community. The research orientation, seeks to increase understanding on the part of the researcher, the client or both (Dick, 1999).

Kervin Lewin who is generally regarded as the father of action research originally postulated a six iterative stage model in conducting action research to facilitate social change. The model included (1) analysis, (2) fact-finding, (3) conceptualization, (4) planning, (5) implementation of action, and (6) evaluation (Baskerville & Wood-Harper, 1996). In practice and depending on the application of action research, the stages may vary. Susman (1983) recommended the five identifiable phases namely: (1) diagnosing (2) action planning, (3) action taking, (4) evaluating and (5) specifying learning when he emphasized that the client-system infrastructure or research environment should be established in conducting an action research. Carr and Kemmis (1986) and Kemmis (1988) proposed a spiral or cyclical four-step approach in doing action research. These are: (1) Planning, (2) Acting (3) Observing, and (4) Reflecting.

Stringer (1999) simplified the stages of Action Research into three phases. These are Look, Think and Act. Looking allows practitioners to build pictures and gather information. The thinking process assists to interpret and explain the problem. Acting seeks to resolve issues and problems. There are several problems of concern with action research. Zinnah (1998) emphasized the need for action research practitioners to acknowledge that knowledge does not exist free from values. The idea of a purely objective, value free- research is a myth. Moreover, the researched (the clientele) should not be mere objects to be studied from a distance but as organic interactive subjects in the process of research. Therefore, structures should be created for participation between the researcher and the clientele groups. The researchers should also be flexible in order to accommodate pluralism in methods i.e. qualitative and quantitative approaches and allow for use of multiple data sources.

METHODOLOGY

The researchers followed the three phases of conducting action research suggested by Stringer (1999). These are look, think and act. In Looking, we defined and described the problem to be investigated and the context within which it was set. The problem identified was low patronage of local rice due to poor quality of processing at Dadin Kowa community. A courtesy call on the Emir and community leaders to explain the objectives of the project paved the way for establishment of the project at Dadin Kowa. An observation at the Dadin Kowa market revealed that the locally processed rice had a lot of impurities such as stones, stalks and sand. Moreover, grains were broken and had poor colour and odour. Forty-seven respondents who were mainly rice consumers, rice traders, food sellers, rice farmers and women rice processors were selected using purposive and snowball sampling procedures. An interview granted by the respondents using a structured interview schedule revealed that consumers consider the purity (absence of foreign materials) followed by colour (whiteness) and wholeness (unbroken) of the grain in selecting rice for consumption.

A community meeting involving women rice processors and visits to the community revealed that:

- The traditional parboiler (23kg) was of low capacity and takes a long time to parboil rice.
- Processors at Dadin Kowa dried parboiled rice along the streets in the open. During drying on tarpaulin or mats, the paddy rice is exposed to the sun and all sorts of contaminants. Direct exposure to the sun leads to rapid and uneven drying causing cracks to reappear in the kernel after parboiling. This increases breaking percent of rice during milling (Imoudu and Olufayo, 2000).
- Stones, sand and other heavy foreign materials affect the quality of paddy rice processed by women processors. Traditionally, stones and other foreign materials in the paddy rice are separated through hand picking. Notwithstanding the ineffectiveness of this method of separation, it is also time consuming and almost a near impossible exercise especially when large quantities of paddy rice are to be processed. Prior to the commencement of the project, the processors had not used the rice destoner although it has been in existence in Nigeria. This was not surprising since it is the situation among many processors in Nigeria. Orebiyi and Eye (2005) have reported that in Anambra State, Nigeria, where they discovered in a survey in a rice market that a greater percentage of rice marketers processed their rice through local means without using the destoner.
- Women processors depended on the flow of natural wind to remove the light foreign materials such as husk and stem of rice from the paddy rice. Bencini (1991) has observed that effective winnowing often stops when the velocity of natural wind is low.

In Thinking, we analysed and interpreted the situation. We reflected on what participants have been doing and identified the areas of success, deficiencies, issues and problems. We concluded that local rice processors in the study area do not have the knowledge about improved parboilers, destoners and winnowers fabricated and disseminated to improve the processing of rice by the Engineering Department of the International Institute of Tropical Agriculture, Ibadan, in collaboration with Sasakawa Africa Association, metal workshops, extension agents and women processors in Nigeria. Moreover, they lacked the resources to acquire the improved technologies. The project, therefore, sought to promote the use of the improved parboiler, destoner, winnower and a solar drying method among the women processors in the study area so as to improve the quality of the locally processed rice.

During the Acting process, we formulated solutions to improve the quality of local rice with women processors, extension agents of Ministry of Agriculture, Sasakawa Global 2000, local fabricators, consumers and traders. An existing rice processor group was identified for implementation of the project. A member each from six wards (Dakum, Garin sarki, Tashan Hinna, Tunga, Hinna, Yelwa/Colony) joined the existing group to ensure a fair religious balance. Gombe State Agricultural Development Programme (GSADP) and African Agro, an agro-

chemical company, donated ₦30,000.00 toward the implementation of the project. Sasakawa Global 2000 donated the improved parboilers, destoners and winnowers. A field trip to Kafin-Gana in Jigawa State by the group to observe the use of improved parboiler, destoner and winnower and convinced them of possibility and viability of the project. A concrete drying floor measuring 4m by 4m with an excavation depth of 5cm was constructed in the community. Six wooden poles dug at 30cm deep and at an interval of 1.3m were covered with tarpaulin to provide shade. A two -day training on use of destoner and winnower was conducted for group members, observers and local fabricators. The products from the project were evaluated over a four week period at the Dadin Kowa market with 32 respondents. The number of people who patronized the products was recorded. The market prices of products of improved and processors' practice were collected. Frequencies and percentages were used to analyse and describe the data.

RESULTS AND DISCUSSION

Comparative advantage of improved parboiler over the traditional parboiler

Data in Table 1 obtained during the parboiling process revealed that, the higher capacity, improved parboiler (100kg) handled a larger quantity of rice conveniently at a time than the traditional parboiler (23kg). Although the steaming period in both boilers was the same, the paddy rice in the improved parboiler took 28hours to dry while the traditional parboiler took 32hours, saving 4 hours. The rice in the traditional parboiler had absorbed more water due to the long period of soaking. The milling percentage of rice from the improved parboiler (56.5%) was better than the traditional parboiler (50%).

TABLE 1: Summary data on Improved and Traditional parboilers

Parameter	Improved parboiler	Traditional parboiler
Optimum capacity (kg)	100	23
Soaking period (hours)	3	16
Steaming period(minutes)	35	35
Drying period (hours)	28	32
Milling Percentage (%)	56.5	50.0

Source - Field Data 2007

Drying of Parboiled Rice

Drying is an important process in obtaining quality rice. A solar concrete drying floor was provided. An assessment by the group revealed that rice dried under the shed had less contamination, was uniformly dried, and protected from human and animal trespassers. Imoudu and Olufayo (2000) have recommended drying under shed and on a concrete floor to achieve even drying, higher yield percentage and lower proportion of broken grains.

Use of Destoner

Results presented in Table 2 show that the level of contamination of sand and stone among the five replicates of paddy rice presented by farmers for processing were not the same. While two different quantities of 200kg paddy rice recorded 320g and 340g quantity of stones and sand respectively, 50kg from another source recorded 152g of stones and sand. However, the fact still remained that the higher the quantity of paddy the higher the amount of stones and sand present. The percentage of stones and sand in rice of the paddy ranged from 0.13% to as high as 0.30%. This is quite unacceptable since consumers generally prefer rice free from stones and sand.

TABLE 2: Percentage Distribution of Quantity of Paddy Rice and Stone produced using the destoner

Replicates	Quantity of paddy destoned (kg)	Quantity of sand and stones realized(g)	Percentages of sand and stones present (%)
1	100	270	0.27
2	200	320	0.16
3	150	200	0.13
4	200	340	0.17
5	50	152	0.30
Mean	120	256.4	0.21

Source - Field Data 2007

Performance of Winnower

A wooden winnower was introduced to women processors to improve on quality of locally processed rice. It took an average of 25 minutes to winnow a 50kg bag of paddy rice compared to 45 minutes that processors used to winnow the same quantity of paddy rice. The group members also rated the products from the winnower to be 90% pure as against the traditional method which was scored 70%

pure. This convinced the group to adopt the wooden winnower to improve on post harvest cleaning of paddy rice which was not dependent on natural wind.

Consumer preference for purity and appearance of improved rice

A survey at Dadin Kowa market revealed that in terms of appearance, consumers preferred milled rice that is white, whole, uniform in size, pure and attractive packaging. Table 3 shows that on the average, 30 people preferred the appearance of improved rice as compared to 2 people who opted for the traditional method of processing rice.

TABLE 3: Consumer Preference for appearance of improved and traditional processed rice (N=32)

Replicate	Number of consumers who preferred Improved product	Number of consumers who preferred Traditional
1	30	2
2	30	2
3	28	4
4	32	0
Mean	30	2

Source: Field Data 2007

Over a 4-week period, quantities of improved rice were sold by a trader in the market. Table 4 shows that 16 to 17 more consumers patronised the improved rice than the traditional rice although price of improved rice per bowl (11.5kg) was ₦30.00 higher than the traditional rice.

TABLE 4: Patronage (acceptability) of improved and traditionally processed rice at Dadin Kowa Market over 4 week period

Week	Consumers who chose Improved product	Consumers who chose Traditional Product	Differences
1	25	9	16
2	31	14	17
3	29	12	17
4	32	16	16

Source – Field Data 2007

An analysis of the market price during the project implementation period presented in Table 5 demonstrates that a price increase of ₦2400 per 100kg bag could be realised with the adoption of parboiler, destoner, concrete drying floor and the winnower to improve the processing quality of paddy rice in Dadin-Kowa community.

TABLE 5: Market price of product of improved and traditional processing methods in Dadin-Kowa market at harvest

Measure	Traditional	Improved	Difference
Price per bowl (11.5kg)	₦110 ($0.90)	₦140 ($1.15)	₦30 ($0.24)
Price per bag (100kg)	₦8800 ($72.13)	₦11,200 ($91.80)	₦2,400 ($19.67)

Source: Field Data, 2007 *Conversion Rate $1: ₦122*

CONCLUSIONS AND IMPLICATIONS

The action research approach enabled the researchers to identify and collaborate with rice processors, extension agents, Sasakawa Global 2000, agro-processors, consumers and community leaders to improve the processing quality of local rice. Adoption of improved parboiler, solar drying, destoner and wooden winnower by women rice processors could produce rice to meet the preference of consumers at Dadin Kowa. The destoner could reduce by 0.21% stones and sand contained in paddy rice. The wooden winnower reduces winnowing time by 25 minutes and improves purity by 20%. Finally, an extra income of the ₦2,400 was realised per 100kg bag of improved rice.

The study has implication for training institution such as universities and agricultural training colleges. Adoption of action research in the training of future professionals will allow them to look, think and act to address the needs of clients. The process can lead to identification of major stakeholders to contribute to needs of clients. The study recommends that the Ministry of Food and Agriculture and other training institutions should promote the action research methodology as it provides opportunities for the creation of functional linkages between the major subsystems of the agricultural knowledge system.

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